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Linux

It's Hot, But Is It Your Next Server OS?

First Looks

Quicken and Money Go Head To Head

Small Office

10/100 Ethernet Switches Overtake Hubs

FIRST LOOKS:

- Postage Goes Online
- USB Video Cameras
- Sony's 50-Inch LCD
- Landel MailBug
- Visio 2000
- Yamaha RP-U100
- Sharp Internet ViewCam

THE INDEPENDENT GUIDE TO PERSONAL COMPUTING AND THE INTERNET

VOL.18 NO.17 OCTOBER 5, 1999

YOU.COM

PLUS:

Best Portals And Search Sites for Finding Anything

SHOW ME LOCAL NEWS AND WEATHER

FIND US A GOOD DEAL ON A CAR

TRACK MY STOCK PORTFOLIO

REMIND ME OF KEY EVENTS

MANAGE OUR FAMILY CALENDAR

MEGA, MEGÁ WITHO MEGA

MEGA, HERTZ UT THE BUCKS.

"I mean, I'm a CNE. Leaving NetWare was a nervous experience for me. But now, every server we have is running on Windows NT. And it's exceeded my expectations, especially with file and print, which is critical to us as a law firm. Our print server is handling 30 million pages a year, and we never have to touch it. So I'd say it's been wildly successful."

Eric Schmidt, Director of Information Services, Bricker & Eckler LLP
on switching to Microsoft® Windows NT® Server 4.0 from Novell NetWare

howericdidit.com

Where do you want to go today?
Microsoft

Michael Miller's Web

No two people are alike, so why should their Web pages be alike? The answer is they shouldn't. People have their own ideas about what they want to see on the Web. That concept sounds simple; in fact, it's leading to an explosion in customization and personalization of Web sites all over the Internet.

Whether we're talking about the kinds of products you're interested in, the types of news and information you care about, or the services you need, getting customized information is great. Users benefit by getting the information they want quickly and efficiently. The businesses that run these sites benefit by improving service and building customer loyalty; they can better target individual customers or groups of customers with appropriate offers and advertisements. This is one of the biggest trends on the Web. You can see it at all sorts of sites (see "The Web You Want," page 98), but particularly at the home pages of many of the portals ("Start Here," page 118).

At first glance, customization is great. But implementation can be complicated. Setting up useful personalization is a complex process for most Web sites, one that requires a lot of work, planning, and specialized tools. It will get easier, however, and thus more widespread.

But of course, the big tradeoff in personalization is obvious: You're giving a fair amount of private information to individual sites. When only a few reputable sites could personalize, you knew who was collecting data. Now, what happens with that information can get out of control.

Most of the people I talk with very much like the idea of customization and personalization coming to the Net, but they still have concerns about privacy. We don't want to worry about who is gathering information and what they might do with it. That's the biggest debate regarding the Web this year.

Some people believe that privacy is simply gone, especially in this era of powerful computers and big databases. Others aren't as pessimistic. Many of the major sites have made some effort to make you comfortable giving the information they are collecting, most notably by posting privacy policies certified by TrustE or BBBOnLine. But organizations like TrustE and BBBOnLine tend to only ensure that there is a privacy policy at the site; they do not investigate the actual rules of the policy. A new effort called P3P may help that, but it's still in its infancy.

So what should be done? The most important thing is for each of us to figure out what rules we want for privacy. Here's where I stand:

First and most important, I don't want sites to share my specific information with any other site.

I want sites to customize the information they give me, so that I can get local news. I want them to track the stocks I care about and the categories of news I want. In fact, I want more control than I have now. I'm even happy to get ads targeted to my demographic group or indicated by my preferences.

Most important, I don't want Web sites to share my specific information with any other Web site.

I want sites to give me cookies that let me return to my customized page quickly, easily, and without a complicated password. I want to be able to read and understand cookies and know what they say about me. I don't want other sites to be able to read my cookies.

I want sites to send me newsletters with breaking information or even special ads, even though I realize that most of these ads make me return to their own sites. I want the ability to subscribe, unsubscribe, or change my e-mail address as I see fit. I don't want sites to sell my e-mail address to anyone else. And I don't want to get any newsletter without first giving my permission.

I want the ability to store my personal information on my own computer and send it to only the sites that I want to have that information. I don't want to use a central service somewhere on the Net that stores everyone's personal information.

Finally, I want the ability to be completely anonymous (or as close to that as technically possible) when I want to be, whether that means using remailer services or Web services that prevent other sites from tracking where you've been and where you are going.

That's what I want. What do you want? Join me online at *www.pcmag.com* and let me know. PC

PHOTOGRAPHY BY JAY REED

More on the Web:
Editor-in-chief Michael J. Miller answers your computing questions every Tuesday, exclusively at PC Magazine Online.
www.pcmag.com/miller

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Cover: Illustration by Visual Logic, photography by Tony Stone Images (bottom); product photography by Thom O'Connor

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Free Software Daily
Remember: This issue's free utility is available online, along with a collection of all-time favorites. Plus: The Daily Download, a fresh pick from ZDNet's Software Library.

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98 The Web You Want

As the Web grows, so does the need to cut through the clutter and find exactly what you want. We look at the sites that are leading the way to a personalized Web and the tools making it a reality. *By David Lidsky*

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118 Web Portals & Search Sites

Getting started is the hardest part, especially online. Portals and search sites are great places to begin. We review 8 portals and 15 search sites to help you find your way. *By Alan Cohen*

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Can deploying Linux in your server room really save you thousands of dollars? We find out by testing a variety of server applications and review five complete Linux server bundles. *By Winn L. Rosch*

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187 Long Live the Switch!

The hub is dead! With switch prices at all-time lows, there's no reason to buy a hub. We review six managed and five unmanaged switches and help you decide which should replace your hubs. *By Frank J. Derfler, Jr.*

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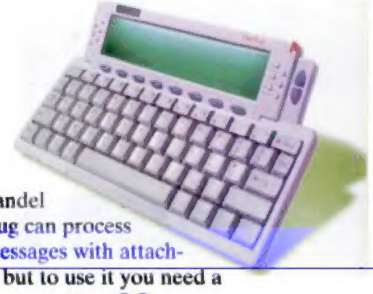

The Landel MailBug can process 16K messages with attachments, but to use it you need a power connection. **66**

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Farallon Fast Starlet Switch/16 PN9160 200
Intel Express 410T Standalone Switch 204
Linksys EtherFast 16-Port 10/10 Auto-Sensing Switch 204
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A Powerful Business PC With A Footprint About The Size Of A Footprint.

Introducing the PowerMate 2000 Microdesktop.

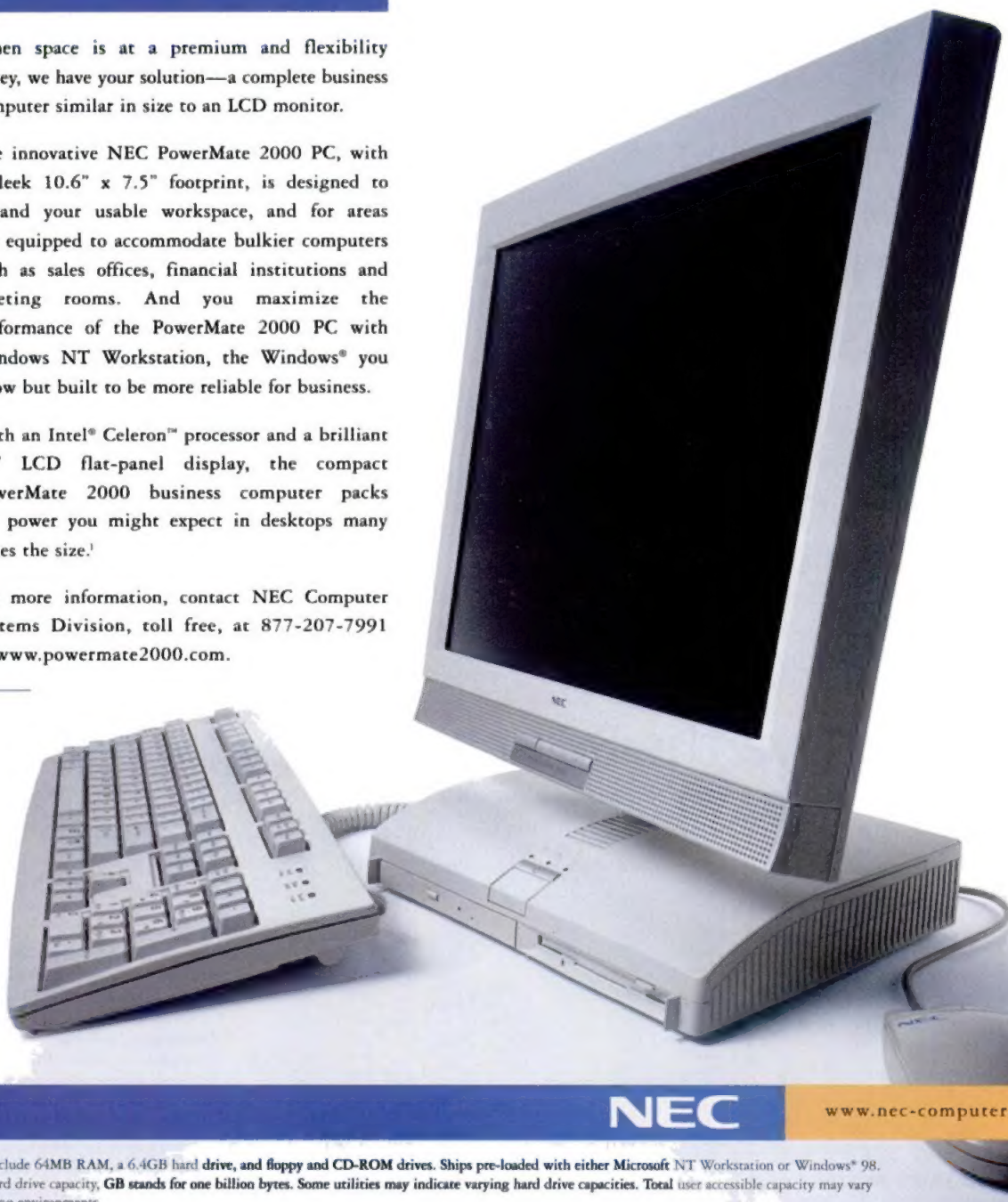
Pre-loaded with Microsoft® Windows NT® Workstation – the most reliable Windows operating system yet.

When space is at a premium and flexibility is key, we have your solution—a complete business computer similar in size to an LCD monitor.

The innovative NEC PowerMate 2000 PC, with a sleek 10.6" x 7.5" footprint, is designed to expand your usable workspace, and for areas not equipped to accommodate bulkier computers such as sales offices, financial institutions and meeting rooms. And you maximize the performance of the PowerMate 2000 PC with Windows NT Workstation, the Windows® you know but built to be more reliable for business.

With an Intel® Celeron™ processor and a brilliant 15" LCD flat-panel display, the compact PowerMate 2000 business computer packs the power you might expect in desktops many times the size.[1]

For more information, contact NEC Computer Systems Division, toll free, at 877-207-7991 or www.powermate2000.com.



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PROCESSOR

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[1] Standard features include 64MB RAM, a 6.4GB hard drive, and floppy and CD-ROM drives. Ships pre-loaded with either Microsoft NT Workstation or Windows® 98. When referring to hard drive capacity, GB stands for one billion bytes. Some utilities may indicate varying hard drive capacities. Total user accessible capacity may vary depending on operating environments.

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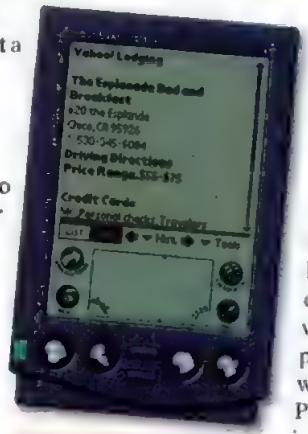
Yahoo! Goes Wireless

The dream of whipping out a hand-held device and getting wireless access to all the Web content and services you're used to receiving only at your desktop is getting closer to reality. Yahoo!, Microsoft, and other players have developed mobile portal sites designed to serve up the Web for these kinds of applications, and we're not far from the day you can actually speak to your mobile, wireless Internet portal.



PORTABLE PORTAL: *With Yahoo! Mobile, the Web travels with you.*

For some time, Yahoo! has been pushing a strategy called Yahoo! Everywhere, designed to bring the popular portal to wireless devices, hand-helds, kiosks, automobiles, and other access devices. Recently, Yahoo! built on the effort by announcing its new Yahoo! Mobile Web site.

If you have a Windows CE device or 3Com Palm device with wireless access options, you'll be able to visit the Yahoo! Mobile site to personalize and filter content shown on a stripped-down version of the standard Yahoo! site. Downloads, shopping options, and other content will all be available at Yahoo! Mobile. In conjunction with the introduction of Yahoo! Mobile, Yahoo! has struck content and wireless-service provision deals with PageNet, Palm Computing, and Sprint PCS, as well as several wireless access providers overseas.

Yahoo! will face some competition. Microsoft recently invested $600 million in Nextel Communications, which Microsoft hopes will help provide ubiquitous access to a new mobile Internet portal Microsoft plans to introduce later this year in conjunction with discounted wireless service deals. Mobile offerings will include Microsoft-specific content, such as news from MSNBC, but will also extend to other Web-based information and e-commerce offerings.

Both Yahoo! and Microsoft plan to offer speech technologies for use with mobile devices and portals, though details and ship dates are not yet available.

Amazon Sues Squatter

Claiming unfair competition, Amazon.com recently sued the owner of a Greek Web site operating the domain names *amazon.gr* and *amazon.com.gr*. The suit claims that Greg Lloyd Smith and affiliated companies are billing the domains as "Greece's Biggest Bookstore." In e-commerce, those who try to piggyback on the success of popular sites by registering domains with similar names are called *squatters*. Amazon is claiming that its trademarks and copyrights have been violated. The e-commerce giant is also charging that Greece's Biggest Bookstore has violated federal Racketeer Influenced Corrupt Organization statutes.

47% of respondents to a recent PC Magazine Online poll told us that they expect to spend from $1,500 to $2,000 on their next home PC systems. Another 25 percent said they'd spend from $1,000 to $1,499. Only 9 percent told us they'd hunt for an under-$500 bargain, and 19 percent said they'd spend from $500 to $999.

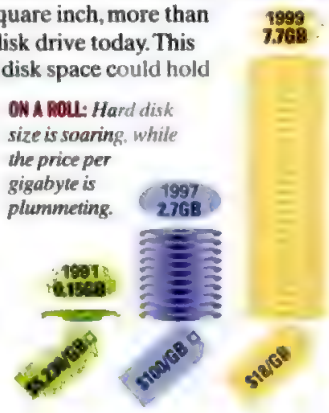
Barbie Boots Up

Giant toymaker Mattel has teamed up with Patriot Computers to sell Barbie and Hot Wheels PCs for kids. The silver-colored Barbie model is outfitted with pink and purple flowers and comes with special accessories, including a Barbie Digital Camera and a Barbie mouse. The blue-and-gold Hot Wheels PC includes a Hot Wheels steering wheel controller and mouse.

The $599 systems each include a 333-MHz Intel Celeron processor, a 3GB hard disk, 32MB of RAM, a 32X CD-ROM drive, a 56K fax modem, a 15-inch monitor, and a library of education and entertainment titles from Mattel Media and The Learning Company. The systems will be available starting in mid-September at *www.barbiepc.com* or *www.hotwheelspc.com* and via telephone at 888-850-4537.

Storage Breakthrough

How's this for progress? Over the past eight years, the average capacity of hard disks has increased more than fiftyfold, while the price per gigabyte has nose-dived. And all signs point to more of the same. IBM researchers recently hit a new record by cramming 20 gigabits (20Gb) of data in a square inch, more than three times the capacity of any disk drive today. This means that every square inch of disk space could hold 2.5 gigabytes—equivalent to two TV-quality movies, 2 hours of MPEG-2 digital video footage, or the text of 2,500 novels. The IBM demonstration used an advanced version of the giant magneto-resistive (GMR) read head technology. IBM estimates that 20Gb-density drives will be available to the public within three years.



ON A ROLL: *Hard disk size is soaring, while the price per gigabyte is plummeting.*

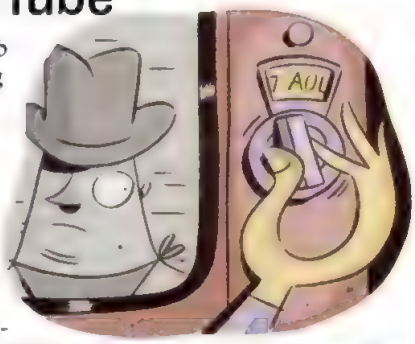
PIPELINE

Tracking Down Cell Phones

Cell phones with tiny Web browsers are novelties now, but microbrowsers are likely to become standard features soon. One nifty trick they'll be able to perform is identifying your location. With this information, the microbrowser will be able to inform a Web site of your whereabouts—for instance, when you want to access movie schedules. The site will then deliver the movie times for the theaters in your vicinity.

This location-tracking feature has a much more serious purpose than finding movies and restaurants in your area. Federal Communications Commission regulations for E-911 enable emergency services to pinpoint the location of phone calls made over phone lines. But make an emergency call over a cell phone and the fire department or rescue squad can't track you down. Legislation now in Congress would require that wireless services grab the location information of cellular phones. This inquiry would take place behind the scenes as you make a phone call. Although such a location finder at this point is accurate only to the closest cell location, accuracy is likely to become more precise.

AOL on the Tube



Television and the Web have been competing fiercely for viewing audiences for some time now, but if America Online has its way, the line between the two audiences will blur. AOL has been pursuing TV initiatives and has formed partnerships with DirecTV, Hughes Network Systems, Liberate, and Philips Electronics to deploy interactive TV services incorporating AOL features. Most recently, the company announced a partnership with TiVo, which makes a VCR-like device that uses a hard disk instead of tape.

With TiVo's hardware, you can record television broadcasts to a hard disk for later viewing. You can also pause and rewind a live TV broadcast if you take a bathroom break.

As an example of how AOL's content will work with TiVo's hardware, let's say you recorded a sports event and wanted more insight into the game. You'd be able to bring up related statistics, provided by AOL, when replaying the broadcast.

THIS ISSUE'S CONTRIBUTORS: *Carol Levin, Sharon Nash, Sebastian Rupley.*

ILLUSTRATIONS BY HAL MAYFORTH (TOP LEFT), TIM WEBB (TOP RIGHT), HARRY CAMPBELL (BOTTOM)

Virus Snoop

Have you noticed that malicious viruses have been grabbing headlines lately? Symantec and IBM are working in partnership to research new ways to attack the problem. Symantec has integrated patented neural network boot-detection technology from IBM into the Norton AntiVirus products. The neural network technology—which comes from IBM's Watson Research Center—uses artificial intelligence to detect viruses that execute when a system is booted.

Symantec had already developed its own expert system–based technology, dubbed Bloodhound, to identify virus-like behavior that occurs when a system is turned on. IBM's neural network–based technology will be an adjunct to Bloodhound for Norton AntiVirus users. According to Symantec officials, the two technologies working together will identify up to 90 percent of new and unknown boot viruses.

Steve White, senior manager of antivirus research at IBM, says the companies are working to create a system that spreads cures faster than viruses can spread.

Top-Selling Retail Software

1. Norton AntiVirus 5.0 Symantec
2. Norton SystemWorks 2.0 Symantec
3. Microsoft Office 2000 Upgrade Microsoft
4. Microsoft Windows 98 Upgrade Second Edition Microsoft
5. VirusScan 4.0 Classic Network Associates
6. Microsoft Windows 98 Upgrade Microsoft
7. QuickBooks Pro 99 Intuit
8. QuickBooks 99 Intuit
9. Norton Utilities 4.0 Symantec
10. Microsoft Office 2000 Premium Upgrade Microsoft

Source: PC Data, June 1999.

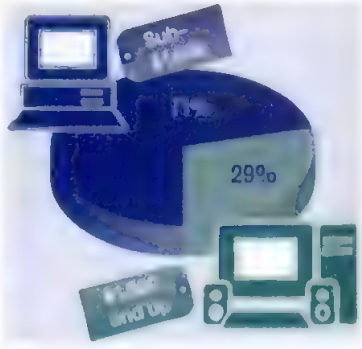
PCs for 2000

Come next year, Intel expects to boost the performances of inexpensive PCs by bringing a new processor core to the popular Celeron line of chips. Specifically, the Celeron's current Pentium II processor core will be replaced by the Pentium III core, which is based on Coppermine—a 0.18-micron manufacturing process that allows for fast clock speeds through reductions in power consumption and leaves ample space for extra processor cache.

Intel says that next year's inexpensive machines based on the new processor core will perform well above current high-end Pentium III PCs.

A Sub-$1,000 Success Story

Sub-$1,000 desktops are hot, with U.S. growth surging from 7 percent of unit sales in January 1997 to 71 percent in June 1999. Despite this high unit volume, the higher-priced PCs make up a huge portion of sales revenues for PC companies. Likewise, high-end CPUs are used as money-makers for the chip business, but the low end is used to maintain market share.



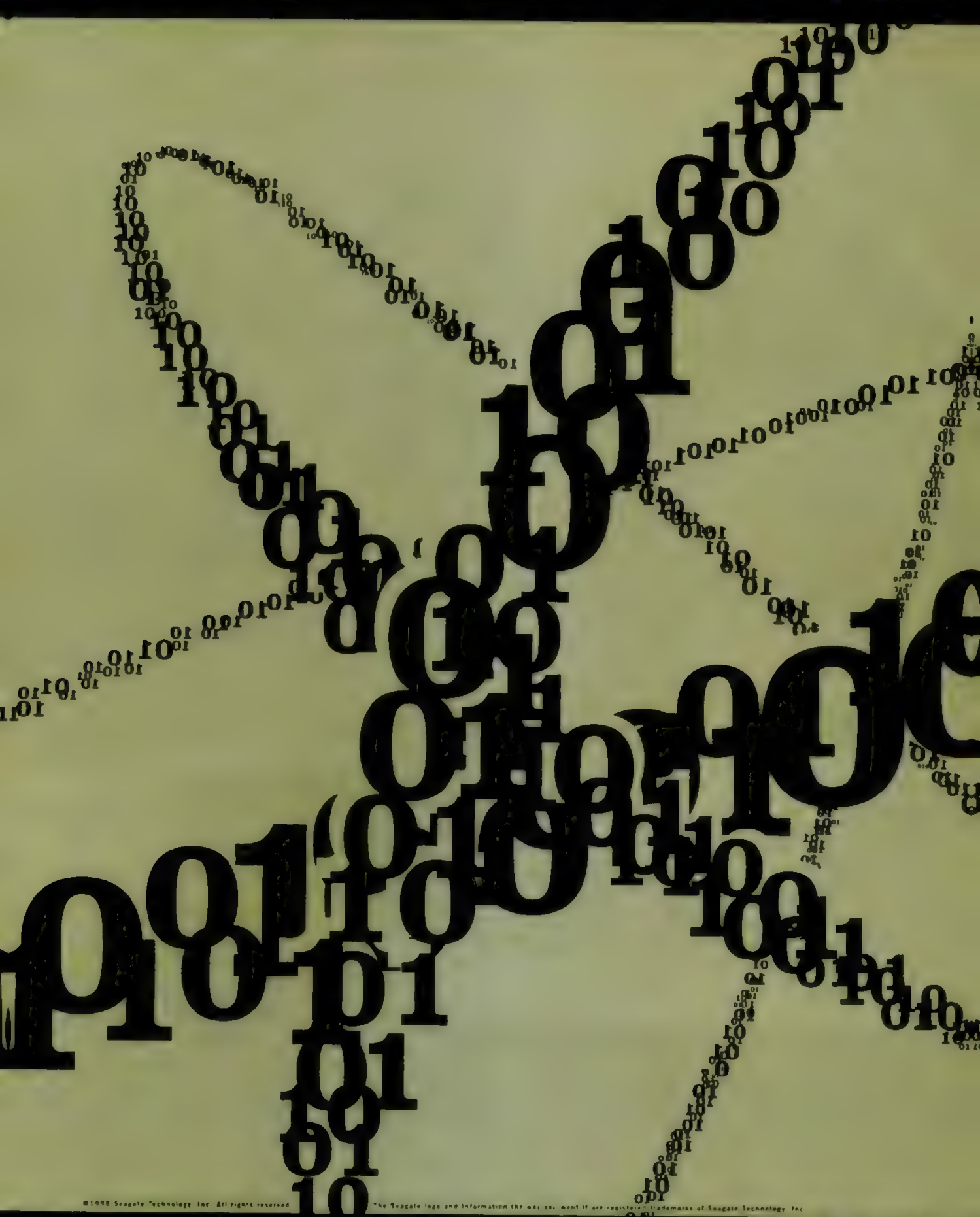
Source: ZD Market Intelligence (U.S. retail desktops), June 1999.

How can my business race ahead on the 8-way highway?

The Compaq ProLiant 8000 and 8500 servers have redefined industry-standard technology, yet again. With its revolutionary new 8-way scalable architecture, Compaq brings enterprise customers a new generation of powerful ProLiant servers. They deliver breakthrough scalability, higher levels of reliability and unbeatable price performance for NonStop e-Business Solutions. They're backed with business-critical Compaq

intel inside

pentium® III xeon™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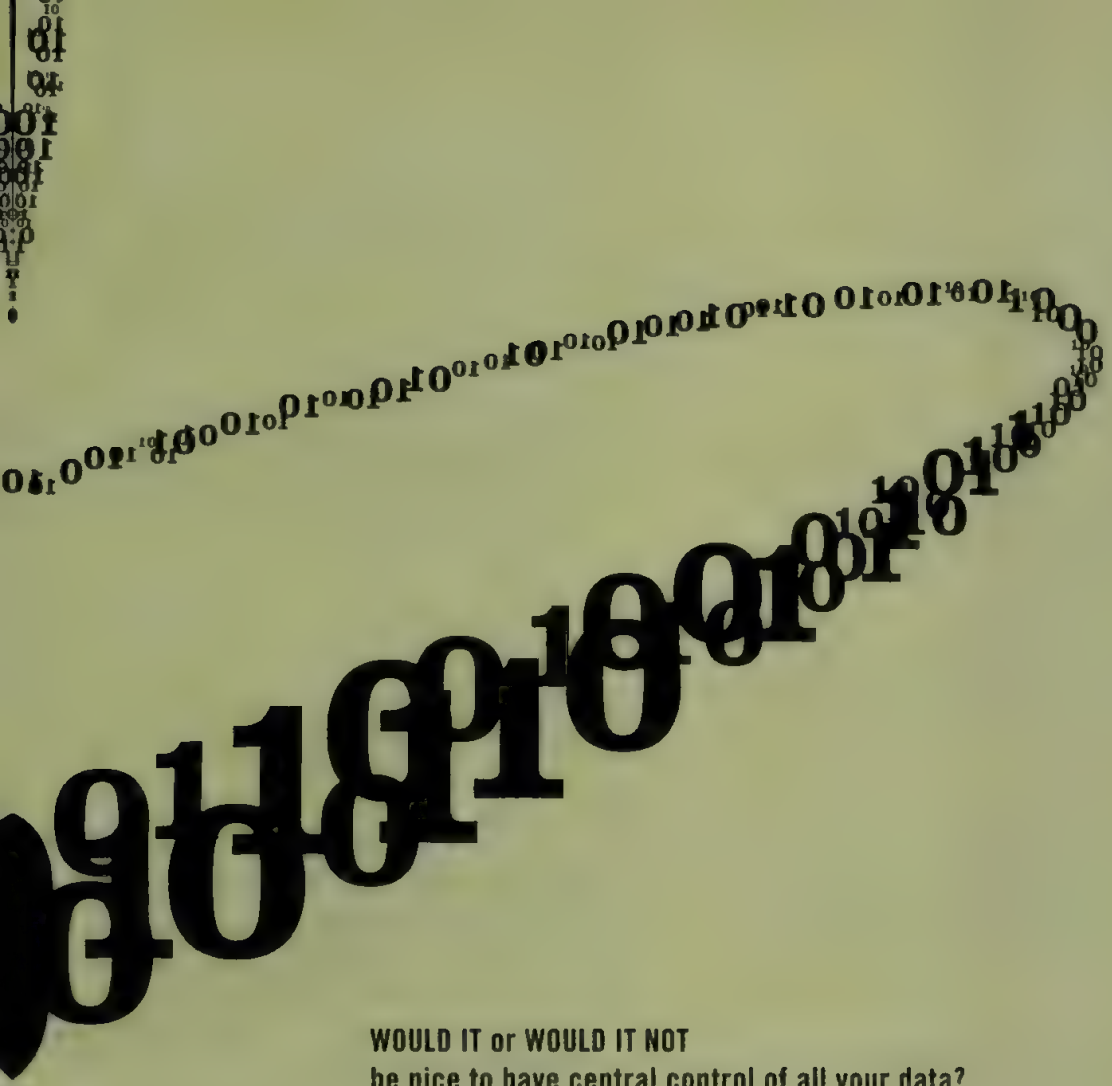

WOULD IT or WOULD IT NOT
be nice to have central control of all your data?

WITH STORAGE NETWORKING, YOU WILL.

In order to take control of data, you need a place to keep it. All of it. Consider the revolutionary new Storage Networking architecture. A new concept for the enterprise. A blindingly fast sub-network dedicated to storage, based on high-speed fibre channel technology. It will make your enterprise information into a flexible, manageable, and continuously accessible resource. It will free your main network from back-up duties that consume valuable bandwidth, and it will speed up the entire network. As Storage Networking becomes a reality, Seagate intelligent storage devices and software will play a central role. And you will be in control.

FYI: [redacted]

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Information the way you want it™

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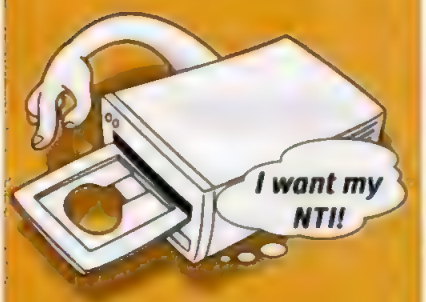
What You Want:

To backup specific files or the entire system to your CD-R/RW drive in 3 easy steps.



What You Get:

A complete backup software solution that unleashes the hidden power of your CD-R/RW drive!

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Surprise! It's Quantex again.

In *PC Magazine's* 1999 Desktops & Notebooks Service and Reliability Survey, Quantex was one of only three vendors to earn an "A" rating in the Desktop Category. Scoring significantly better than average in all 5 test categories—units needing repair over the past 12 months, satisfaction with reliability, satisfaction with repair, satisfaction with technical support, and buy again?—*PC Magazine* praised, "Its technical scores are first-class."

intel inside
pentium III

* Results based on a PC Magazine (July 99) "Desktops and Notebooks Service and Reliability" survey in which Quantex received an "A" rating in the Desktops—Overall Use category, beating out Gateway and Compaq which received ratings of "C" and "D" respectively. Quantex received an "A" rating by scoring significantly higher than average in all 5 test categories. See PC Magazine July 99 for details.

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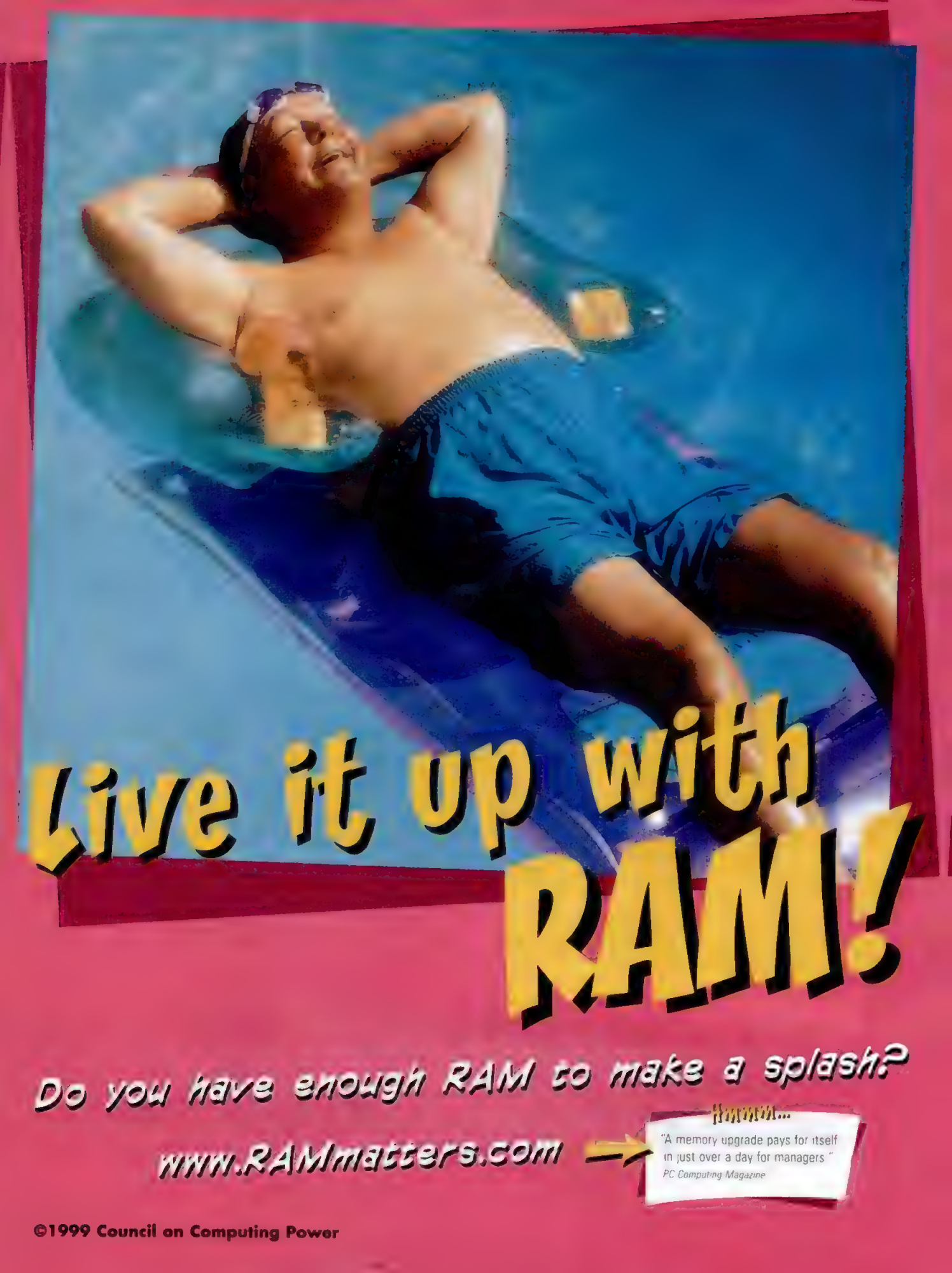

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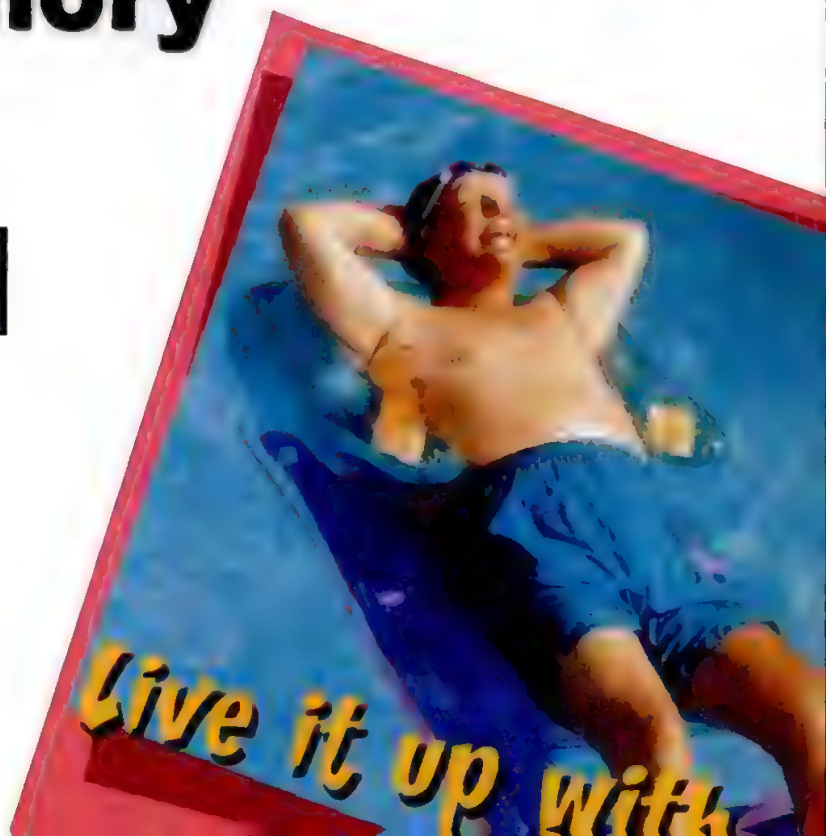

PEOPLE'S FIELD TEST # 3552
>> COMPUTING & TECH

LETTERS

CONNECT ANYWHERE

I just finished reading "Connect Anywhere," (August) and want to clarify something that was written about the power management on the latest Apple G3. You wrote in the "Desktop Replacement" section that the system takes quite a while to resume from suspend mode. What is your definition of "quite a while"? My 400-MHz G3 (the same configuration you looked at—but with 128MB of RAM) wakes up in 10 to 15 seconds. This is much faster than the Gateway Solo 9100XL that I had (with specifications similar to my current machine). The 9100XL took anywhere from 1 minute 30 seconds to 2 minutes 30 seconds to wake up. I've also used a Sony VAIO F-150, which takes 25 to 30 seconds to resume from suspend mode.

I also want to add that this is the first laptop, PC or Mac, that has worked absolutely flawlessly for me. I've pretty much supplanted my $12,000 desktop machine with my G3 laptop.

RYAN LA RIVIERE
via the Internet

During testing at PC Magazine Labs, we found that the G3 took from 20 to 25 seconds to resume from suspend mode. Several other machines on the market may take a similar amount of time—including a few Gateway Solos we've reviewed in the past—but we prefer notebooks that resume much faster. Otherwise, the G3's power management features were very effective.—Ed.

DEBATING DATABASES

In your recent database roundup ("SQL Database Servers," August), why did you award an Editors' Choice to the product that "has no special image, sound, video, or geographic data support" (Microsoft SQL Server 7.0)?

Price and administrative ease are important considerations for companies investing in database technology. Perhaps, though, they should not be the only considerations. Everyone wants to simplify administration, but the costs of oversimplification are significant. SQL Server has a 8K block size, sure. But what if the database is primarily an online transaction-processing engine? A 2K block size might work better. This is why Oracle gives administrators a choice of block sizes. SQL Server's database cache expands and contracts dynamically? Whoa! Most database servers in small companies (SQL Server's market, I think) are running other applications as well. Do we really want SQL Server making unilateral decisions about memory utilization in this environment?

You wrote that SQL Server may not be the best choice for those who "put part of the code in the database itself." Who might that be? Everybody. There's no other way to make sure that your database rules are honored, regardless of the access path. I'll take Oracle PL/SQL over Transact-SQL every time.

> I've supplanted my $12,000 desktop machine with my G3 laptop.

PAUL DALBERTH
via the Internet

Choosing a database is a tough balancing of your needs, skills, and finances. For small to midsize companies, we think price and lack of administration headaches are important, but strong performance on multi-CPU servers and support for data warehousing are also essential. Oracle8i Standard Edition does poorly in all four of these areas, deficiencies that its advantages in multimedia data handling, programmability, and flexible block sizing just don't make up for in this market. Microsoft SQL Server's automatic memory sizing is actually of greatest use when you are running other applications on your database server, since the database adjusts to accommodate their memory needs. The feature is also easily disabled.—Ed.

HOME NETWORKING

I had no idea there would be such a useful article as "Home Network Setup" (Solutions, August) in your magazine. I was very pleased, because I am currently trying to persuade my mother to get a second computer so we can network our modem access. I was happy to see just how easy and inexpensive it is. Now I know that getting her to go along with it might not be so hard.

JAMES
via the Internet

In response to the article "Home Network Setup": I think that the article is definitely on the right track, but it lacks a few important details.

The first is how to choose between a hub and a switch. This is one area in which I wish I had had more knowledge when I first set out to build my home network. Knowing that a hub is "shared bandwidth" (meaning that the 10 or 100 Mbps split to however many ports are on the hub) could be a major factor in someone's decision to purchase a hub rather than a switch or vice versa. I used to own a five-port Linksys 10/100-Mbps auto-switching hub on which I had connected four PCs. The more computers I put on the hub, the slower the network ran.

I also would have liked to have known that on a hub, only two computers can talk and listen at a time, and that if one PC gets kicked off of the network, it will likely pull at least one other PC off with it.

CHAN SARINYAMAS
via the Internet

You did an excellent job with your article on home network setup. It made me realize that I needed one in the house, and it went over all the details clearly and precisely. I bought the Netgear kit that you suggested. When the installation instructions became confusing, I just went back to your article, and all was clear again. My network is up and running, and I am smiling.

JOE ANTHONY
San Diego, California

It would have been helpful if your tutorial on home networking had mentioned that if your Internet access point is a DSL or cable modem, then you need two network interface cards, one for the modem and one for the intranet.

TED REINER
via the Internet

BEFORE YOU VIEW

Rocco Cassano raised a good point about the lack of a print preview in Microsoft Internet Explorer 5.0 ("The Final Word," Letters, August), but how necessary is print preview really? An often overlooked feature is the ability to print just a portion of a Web page by highlighting the information you want to print, going to File/Print, and then choosing the Selection button in the print range. This also works in several other Microsoft programs, including Word and Excel. By reading the tip of

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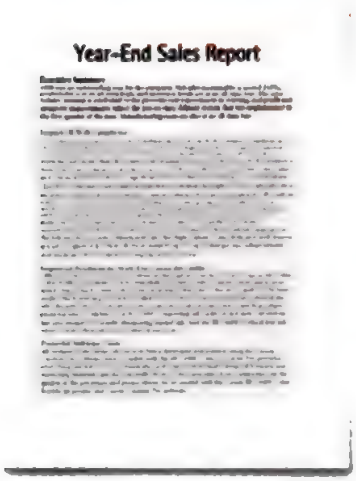

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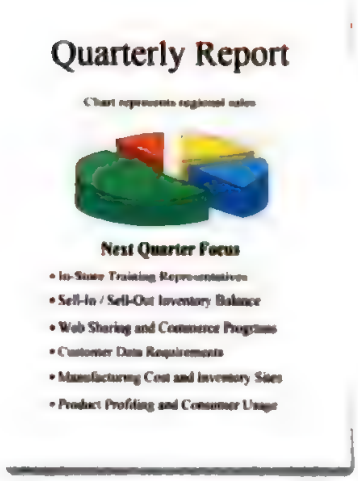

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LETTERS

Corrections and Amplifications

Because of an editing error, Inside Track on September 1 stated the data-transfer speed of the Iridium phone as 2,400 Kbps. It should have read *2.4 Kbps.*

In a Site Finder article, "Check Compliance" (August, page 36), the URL for Viasoft's OnMark 2000 BIOS Test & Fix should have been *www.onmark.viasoft.com.*

In the Summary of Features in our story on portable computers ("Connect Anywhere," August, page 202), we should have indicated that PC Card modems offered by the vendors are most often extra-cost options and are not usually included in the prices we cited.

the day from ZDNet.com, Mr. Cassano, too, could have such glorious tidbits of knowledge.

JOHN TRUXTON
via the Internet

ONE SMALL STEP FOR HACKERS...

Your article on computer hackers ("The Hacker Ethic," August) is right on, and I agree that *cracker* is probably a better term.

The term *hacker* originated before anybody, except maybe a few Defense Agency people, ever heard of the Internet. The original hackers hacked into their own Apple IIs.

The Apple II had very little software for it. Back then VisiCalc was the killer app. The hackers of that day painstakingly examined the Apple II's memory, issued a command, and examined memory again to find out what had changed. They found out the undocumented features of the computer. They used those features to develop games, which made the Apple II popular. The Apple II's popularity made the PC industry possible.

WAYNE ANDERSEN
via the Internet

MOM, CAN I HAVE THE CARD TONIGHT?

I usually agree with most of *PC Magazine*'s views, but when I read "Online Pocket Money" (Trends, August), I couldn't have disagreed more. I'm a computer-savvy 17-year-old who used to work at a local computer store, and I know from experience that adults are far more hesitant than kids when it comes to e-commerce. Most of them, my parents included, were very afraid at first to give their credit card information to a business they'd never seen. Although it took a lot of coaxing before they let me use their card, I now buy almost everything off the Internet—clothing, music, movies, and all my computer products.

TROY GARKEY
via the Internet

CABLE CONNECTION

In the July issue's "User to User," Allen Ridderhoff asked why he couldn't get Windows' Direct Cable Connection (DCC) to work; and despite your numerous suggestions, I'm betting the problem is with the cables. Having had the exact same problem and having run through every other solution Microsoft support could offer me, I finally took the advice and bought new serial and parallel cables that were specifically labeled as supporting DCC. And the problem was solved.

EDE BAUMAN
via the Internet

COME TO THINK OF IT

In his July Inside Track column, John C. Dvorak recommends DiskJockey 98 for file management. In fact, he says, "Don't even think about it, just buy it." I thought about it anyway and decided to try the demo first. Good thing I did. Installation was simple and straightforward, but within the first 30 minutes of using it, I had no fewer than three lock ups—one of which I can repeat easily, the other two I can't.

After getting familiar with its features, I started testing the viewer. One document I was viewing had hyperlinks to other files in the same folder. Clicking these worked well, until I attempted to view these files a second time. To my dismay, the files were gone. After looking in my Recycle Bin and searching the entire hard disk, I determined that they were totally lost. After recovering these from my backup, I carefully did the same thing again—and again they were gone. Is this what Dvorak meant when he said "killer"?

JOHN GRUENER
Orlando, Florida

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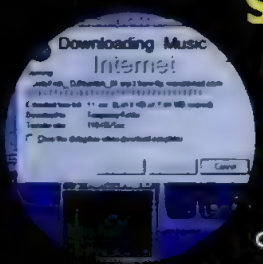

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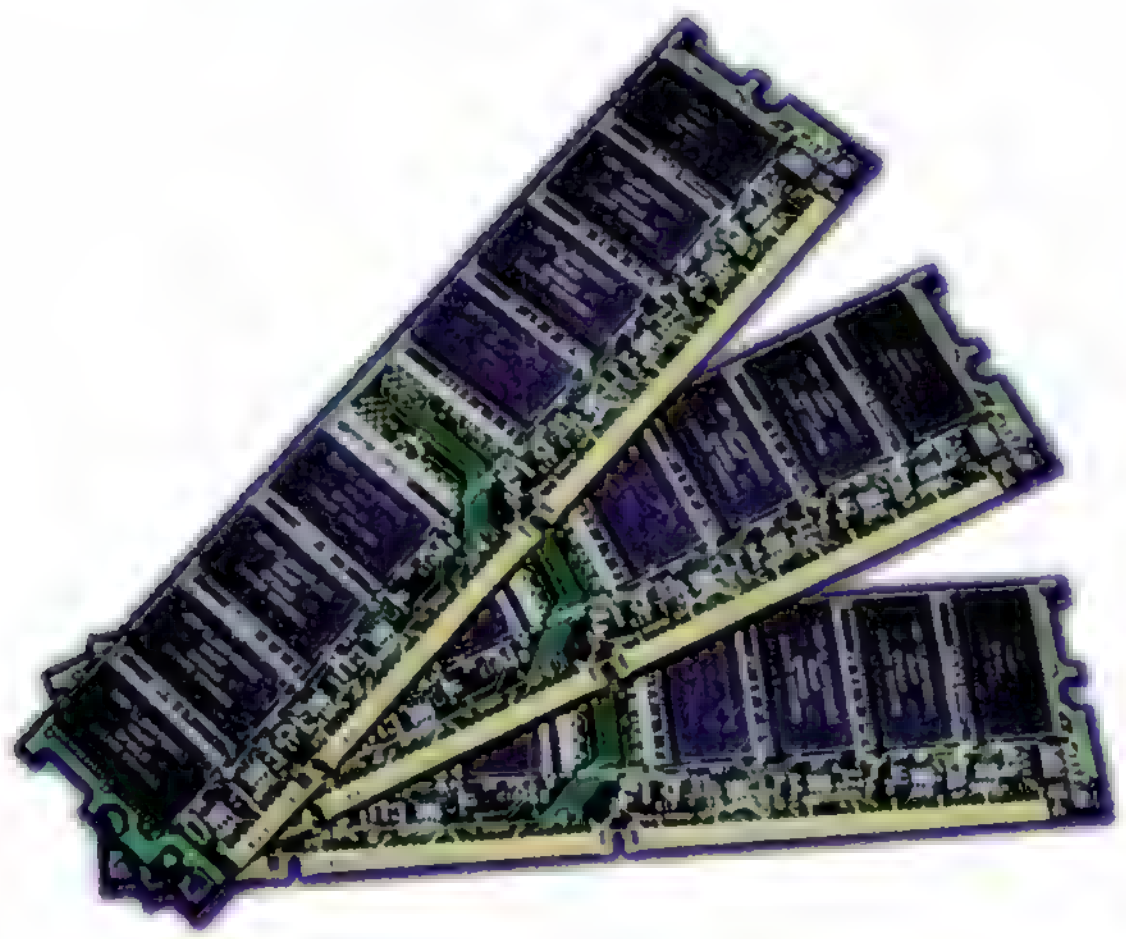

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Battery Boosters

Want your portable devices to last a really long time?

Anyone who's ever owned a cell phone, PDA, or notebook PC has cursed the brevity of battery life. It's the number-one concern of portable device users, according to market research firm IDC, easily beating out weight, display size, and backlighting. And the concern is perfectly understandable. Nothing is more annoying than having a phone conk out in the middle of a conversation or being unable to boot up your notebook on the road. Hope is on the horizon, though, as developers scramble to deliver longer life for your ever-increasing collection of portable gadgets.

Because battery life is such an important piece of the portable puzzle for so many, researchers are trying several new approaches to supercharging your batteries. Traditional research has focused on the composition of the batteries themselves, and this has allowed batteries to progress from nickel hydride to lithium ion to lithium polymer. But the longest-lasting batteries are still too heavy for all but the hardiest road warriors to lug on long trips. Some companies are developing software that optimizes battery charging and life; others are going even farther afield.

Compaq designer Adrian Crisan recently filed a patent for a keyboard that powers a notebook's battery. The keyboard is embedded with magnets and coils. Each time you strike a key, an electric current is fed to a generator, which powers your notebook's battery. The keyboard is still in the early stages of development, but it may not hurt to start brushing up on your typing skills now.

Another possibility may be the replacement of conventional batteries with miniature fuel cells. As reported in *Scientific American* in July, scientists are working on ways to harness the power of fuel cells that run on methanol. In theory, such fuel cells can provide 20 times the power of traditional nickel batteries. They can also be refreshed by adding fuel, rather than a time-consuming recharging process.

For now, however, most devices have batteries that require frequent recharges. And the actual life span of the battery is somewhat diminished with every recharge. Software maker enrev Corp. has come up with a battery operating system that speeds up the recharge process and keeps batteries alive for a longer period of time. The company's test results show that by using the operating system, batteries will recharge in half the time and last at maximum capacity for more than 1,000 recharges.

Traditional battery-charging methods force energy into a battery through constant, direct current, a simple and low-cost option for manufacturers. This method, however, can overcharge batteries. If more energy than necessary is applied to a battery's cells, their temperature will rise and the battery's materials will corrode. The corrosion gradually erodes battery capacity; this causes each recharge to last less time than the previous one. The enrev software uses a variable charging algorithm that adjusts the charge in response to the state of the battery and thus speeds up the charging process. The software also measures the charging rate to avoid overcharging. The enrev operating system works with nickel- and lithium-based batteries and is compatible with most battery-operated products, including those that use the Smart Battery Systems (SBS) protocol. Partners have not yet been announced, but enrev expects products using its software—including cell phones, hand-held devices, and notebooks—to be available in the first quarter of 2000.

Meanwhile, in case you are searching for a boost in battery life for your portable devices but don't want to wait until next year, Duracell claims that its enhanced Ultra batteries can provide a power boost of 50 percent over regular alkaline batteries. In the short term, that may be just the power lift you're craving.—*Sharon Nash*

Keyboard Power Generator

Compaq has filed for a patent on a keyboard power generator that captures energy generated during data entry and uses the energy to charge a battery. The concept calls for one or more magnets mounted on the keys and one or more coils mounted on both ends of the magnets. When you type, the magnets traverse the coils and the movement generates a current. The current generated by the keys charges the battery

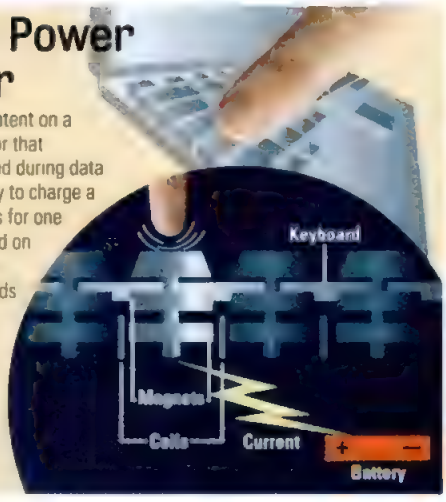
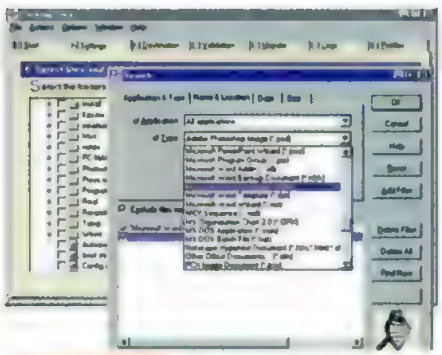


ILLUSTRATION BY DOUG ROSS

More Trends Online • Low-cost, high-speed wireless networking • Kid-safe Web surfing • Polysilicon display technology • Plus: Expanded versions of the stories in this section. www.pcmag.com/trends

Moving Is A Hassle

For several years now, heavyweight companies ranging from Microsoft to Intel to Sun Microsystems have been talking about *replicating system state*—reproducing the entire configuration of one computer for efficient migration to a new one. Two new products from a pair of small companies—Miramar Systems and Tranxition Corp.—are taking aim at automating the laborious steps involved in system migration.



▲ **EASY MIGRATION:** *Desktop DNA automates the transfer of apps and settings to a new system.*

Miramar Systems' Desktop DNA is designed to personalize system migrations by moving Windows settings, applications, and data files from one PC to another. You can transfer not only files and applications but also configuration settings for your desktop, network, printer, and applications.

Desktop DNA is based on a scripting language that draws system and application information from a PC and provides scripts for many Windows applications, including Excel, Microsoft Office, Netscape Navigator, Norton AntiVirus, and pcAnywhere. On a network, where users or administrators may want to replicate sets of applications or files on all company systems, the settings, applications, and files selected can be saved as a profile or template.

Tranxition Corp. has developed software called Personality Tranxport MC, which captures and moves desktop configurations, network and Internet settings, service and protocol information, Microsoft Office applications, Internet favorites and bookmarks, e-mail address books and in-boxes, custom dictionaries, and more. Users or administrators in network settings can capture the configuration of a single PC and replicate it on many PCs on the network.

Computer vendors are also showing interest in system migration tools. Both Hewlett-Packard and IBM have utilities that perform functions similar to those of Desktop DNA and Tranxport MC.—*Sebastian Rupley*

INSIDE PC LABS

Take the Tunnel to Work

PC Magazine Labs recently turned its Internet infrastructure into a testbed for evaluating several virtual private network (VPN) products for use at our company, Ziff-Davis. With a VPN installed, a company can save significant dollars on remote-access costs—long-distance charges, toll-free–number charges, and the cost of racks of modems connected to remote-access servers—because users connect to the corporate network using their existing ISPs and desktop browsers. With the Internet as the transport mechanism, the VPN serves as a secure, encrypted tunnel into the network.

Before selecting a VPN product, it's important to consider cost, manageability, scalability, security, ease of installation of the remote client, and performance. For Ziff-Davis, the key benefit a VPN offers is the savings on remote access. The comparative costs of the products are less of a concern for us, because our remote-access costs are so high. Any solution would pay for itself in three to six months. Because each of the products we're evaluating—DEC AltaVista Tunnel, Intel (Shiva) VPN, and V-One SmartGate—supports at least triple-DES encryption and has some form of token or certificate authority, we've focused on the ease of deployment.

With approximately 1,200 users—many of them off-site—the client installation has to be simple enough that nontechnical users can install and use the VPN. The last thing we want is to flood our help desk with calls for installation assistance. Though our pilot program is still under way, here's what we've found so far.

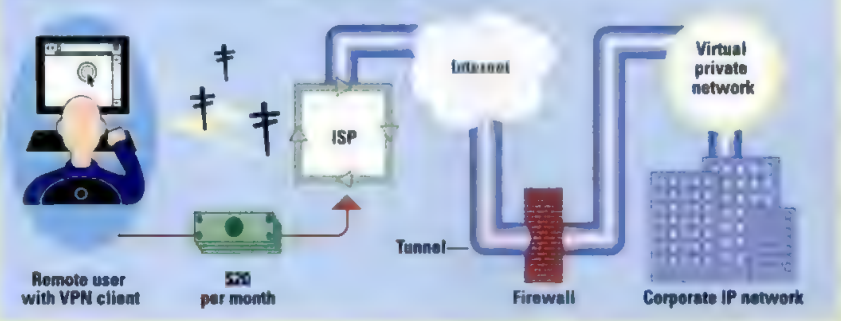
DEC AltaVista Tunnel has separate client installations for Windows 9*x*, Windows NT, and Mac OS. Since installation on the Windows 9*x* platform relies on an updated version of Dial-Up Networking, early versions of Windows 95 require an updated DUN. The AltaVista software also needs a patch, though we expect that this will be fixed in future releases. A system administrator must also generate keys and distribute them to clients.

Intel (Shiva) VPN has separate installations for Windows 9*x* and Windows NT. There are no plans for a Macintosh version. The client installs its own virtual network adapter into the network control panel, but the Microsoft adapter must first be uninstalled. This step complicates installation. Rather than using the Shiva certificate manager, we installed a Remote Authentication Dial-In User Service server and connected it to our NetWare Network Directory Services (NDS) tree. Authenticating against our existing NDS tree eliminates the need to create a separate VPN account for every user, but it also requires that users know their locations on the NDS tree in order to log on.

V-One SmartGate offers a single client for Windows 9*x* and Windows NT. There's a separate client for the Macintosh. The V-One client is small enough to fit on a floppy disk as a self-extracting ZIP file. We installed the client as a TCP/IP translator, so the installation took place independent of dial-up networking configurations. This, coupled with a Web-based online registration program, made the V-One remote client the simplest of the three to install.

PC Magazine Labs will use what we learn from our pilot VPN in formal product testing. Look for a feature story on VPNs in our issue of January 4, 2000.—*Craig Ellison*

VIRTUAL PRIVATE NETWORKING For a company with many remote users who need access to the corporate network, a virtual private network that lets workers use their ISP accounts to achieve this access is much more cost-effective than using an expensive toll-free phone number or making long-distance calls to the company's remote-access servers.



PHOTOGRAPHY BY TOM O'CONNOR (TOP)

INTERNET

Official Okay for Online Postage

The convenience of printing postage from your desktop has long been a tantalizing vision, but PC-based postage systems have been stuck in regulatory red tape and field testing for years.

Recently, the U.S. Postal Service gave its approval for two early innovators in the field, E-Stamp and Stamps.com, to begin offering products nationwide. Competitors Neopost and Pitney Bowes are waiting in the wings to bring out their full services this fall.

The small-office/home-office market accounts for about $12 billion of the $60 billion spent annually on postage in the U.S., says Ray Boggs, an analyst for market research firm IDC. He expects that within five years about 10 percent of the SOHO postage business will be online, representing about $1.2 billion.

All the postage products are based on the U.S. Postal Service's Information Based Indicia Program (IBIP), a bar code postage system that lets you print secure mail-processing information on envelopes and labels from any printer.

With E-Stamp, you connect a small device to a PC's parallel port and plug a printer into the device. You can download up to $500 in postage (the USPS limit) into the device and then print it out whether you're online or off-line. E-Stamp has partnerships with AOL, Compaq, Microsoft, and Yahoo!

Stamps.com's service is entirely online. You can download the software, set up an account, and immediately print postage. Stamps.com has partnerships with AOL, OfficeDepot.com, and Quicken.com. Like E-Stamp, Stamps.com integrates with Microsoft Word and Microsoft Outlook.

Neopost already has a PC postage system called Simply Postage, but this requires a special printer. Its new products, PC Stamp and Postage Plus, are currently in prerelease testing. Neopost expects Postal Service approval soon. PC Stamp is a standalone secure-meter device that lets you download and store postage via the Internet. Postage Plus is a full Internet solution that lets you download and print stamps while online.

Pitney Bowes has two new services based on the IBIP system: ClickStamp Online and ClickStamp Plus. ClickStamp Plus requires a hardware attachment to your PC and uses the USPS address CD-ROM when you print postage. You can store up to $500 worth of postage and print it at your convenience. ClickStamp Online will be an Internet-only solution. —*Sharon Nash*

A Rejuvenated Compaq

Jake Kirchner

Compaq Computer Corp., which 17 years ago saw the potential of the personal computing industry more clearly than most and rode that vision to become the undisputed PC market leader and a $30 billion multinational corporate giant, today finds itself struggling.

There's no doubt the company has been in the doldrums. Even Compaq executives are quick to acknowledge that this has been a trying year for the Houston-based company. Following its mid-1998 acquisition of Digital Equipment Corp., Compaq struggled to integrate the two very different companies, seemed to stagger under the relentless marketing blitz of its Texas neighbor Dell Computer, seriously disappointed Wall Street with its financial results, and ousted its longtime chairman Eckhard Pfeiffer. As one top company official told us recently, Compaq had "hit the wall."

Trying to get a good read on the Compaq of today, a group of *PC Magazine* editors traveled to Houston for a midsummer sit-down with several dozen execs and product managers. My quick take: Despite a year's worth of traveling a hard road, the folks at Compaq are more energized today than we've seen them in many years.

During a similar *PC Magazine* trip a year earlier, we found no great vitality within the Compaq campus. Although it should have been a good time in the company's life—it was preparing to take over Digital and greatly expand its size and market potential—there was palpable uncertainty about Compaq's ability to succeed quickly in the enterprise markets it hoped to enter using Digital's resources. And there was open concern about Compaq's response to Dell's direct-marketing onslaught, which was quickly eroding Compaq's market share.

The concerns were well founded. One company official told us, "Instead of bringing PC economics to the enterprise, we brought enterprise economics to the PC world." The numbers don't lie. In April, Compaq reported a loss of almost $3 billion on revenues of $31.2 billion, compared with a gain of almost $2 billion on revenues of $24.6 billion a year earlier. Pfeiffer and several other top executives were gone soon thereafter.

So how to explain the confidence we found among the company leaders on our recent visit? Well, for one thing they believe they've survived the worst of their problems. And with some justification. For the second quarter, the company reported losses of only $184 million on revenues that grew 17 percent over the same quarter a year earlier. And International Data Corp. recently reported that Compaq retains its PC market-share leadership. The numbers are thin in the U.S., with Compaq providing 16.6 percent of the PCs shipped in the second quarter and Dell shipping 16.3 percent, but a bit more comfortable worldwide: 14.6 percent to Dell's 10.8 percent.

These market and financial numbers aren't great, but they're a decent place to start the rejuvenation process. The company also has a new CEO in Michael Capellas. Compaq has new strategies for the Internet and for meeting Dell's competition, it has a newly streamlined organization, and it has a range of new products you'll be reading about here in *PC Magazine*. Look for much better things from this company in the coming year.

PHOTOGRAPH BY JAY REED; ILLUSTRATION BY ROBERT NEUBECKER

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Female Premiums

Age	10 YEAR	15 YEAR	20 YEAR	25 YEAR	30 YEAR
35	$ 103	$ 125	$ 145	$ 183	$ 205
40	$ 123	$ 158	$ 185	$ 238	$ 260
45	$ 190	$ 215	$ 253	$ 330	$ 385
50	$ 253	$ 290	$ 363	$ 490	$ 495
55	$ 365	$ 413	$ 550	$ 835	$ 1,015
60	$ 503	$ 615	$ 845	$ 2,135	$ 2,400
65	$ 775	$ 975	$1,593	$ 3,900	$ 3,900
70	$1,338	$ 1,600	$2,970	$ 7,220	$ 7,220
75	$2,275	$ 4,870	$5,820	$10,370	$12,420

Male Premiums

Age	10 YEAR	15 YEAR	20 YEAR	25 YEAR	30 YEAR
35	$ 123	$ 138	$ 165	$ 223	$ 253
40	$ 148	$ 183	$ 225	$ 288	$ 335
45	$ 225	$ 300	$ 360	$ 450	$ 513
50	$ 338	$ 455	$ 525	$ 743	$ 828
55	$ 500	$ 670	$ 768	$ 1,640	$ 2,330
60	$ 783	$ 990	$1,335	$ 3,630	$ 3,630
65	$1,330	$ 1,650	$2,693	$ 5,250	$ 5,250
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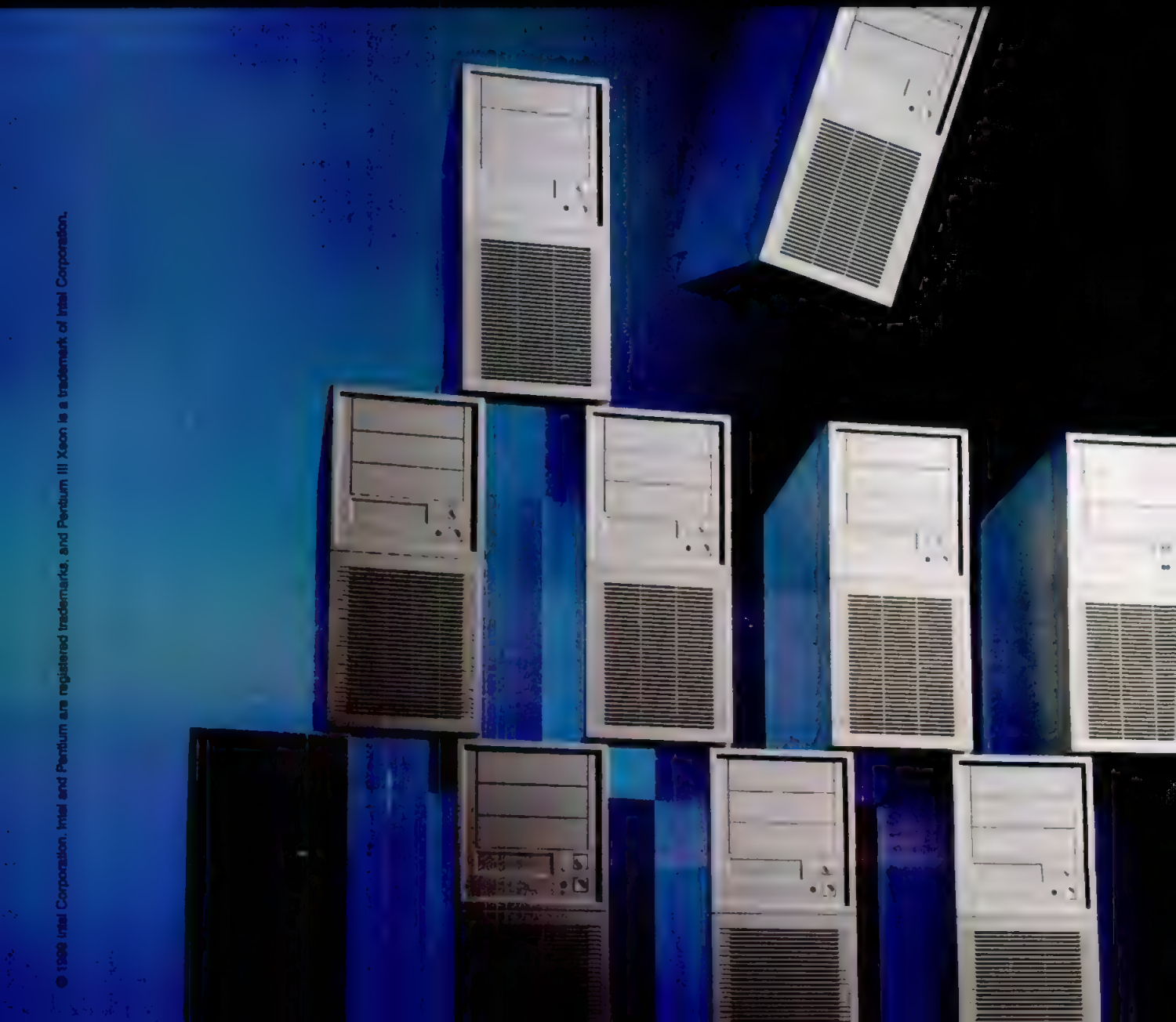

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INTERNET

Self-Service Repairs

E-SUPPORT: *Motive Communications delivers Web-based technical support (left). Digital River's ebot keeps your apps up to date (above).*

Just accept it: Computers break. Until the industry comes up with the unbreakable computer, however, there's some relief in sight: Computers that fix themselves. For hardware vendors, this can mean not only happier customers but also substantial savings in the customer support department.

Several support companies are turning the Internet into a self-help center, where distressed computer users can diagnose their systems, download fixes and upgrades, and get answers to technical questions on thousands of hardware and software products. Motive Communications, a developer of software support systems, expects some big payoffs. It plans to cut $25 billion out of high-technology support by 2005.

Motive Solo is a tool that help desks can use to build self-repair services for customers. Motive analyzed 40,000 support calls, supplied by Microsoft, and identified the simple and repeated problems that could be effectively automated though self-service. According to Motive, simple and repeated problems account for 30 percent of a company's support labor costs. Solutions to these common problems are stored on Solo servers accessible over the Web. Software updates and fixes are then delivered over the Web to your browser.

One key component of Motive's architecture is ActiveSense technology, which automatically discovers the characteristics of a troubled system and uses the information to help you solve the problem at hand. It knows what brand of computer and printer you're using, collects data on the state of the computer, and personalizes the support portal by displaying only information that applies to your system. Motive Solo is also designed to let help desks deliver preventive services, such as updates and how-to information. The first systems with Motive's self-repair capabilities are Dell PowerEdge servers, which started shipping in August.

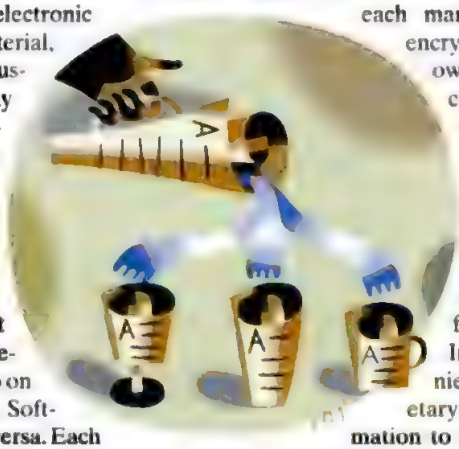
ServiceWare also offers a support portal at its recently launched *www.writeanswers.com*. On a daily basis, major software companies such as Microsoft and Lotus feed the site with customer support information. ServiceWare is planning to add an e-commerce component to the site in conjunction with Computer Discount Warehouse. If your system needs extra memory, for example, you'll be able to order it right from the Web.

Meanwhile, to take much of the legwork out of updating all your applications, Digital River has developed ebot, a small application you load on your PC that automatically updates your applications with fixes and upgrades as they come out. ebot automatically fetches updates from Digital River's database of 3,000 applications.—*Carol Levin*

ELECTRONIC BOOKS

E-Books Open Up

Remember the VHS-versus-Betamax fight? Electronic book producers certainly do, and they're hoping to avoid the same drawn-out struggle that eventually led to a single victor. They've teamed up to produce an open standard that will let publishers produce one electronic version of their material, which can then be customized to suit any reading device: electronic book, PDA, or desktop computer.



The first attempt at electronic books took the proprietary approach. A book produced for the Rocket eBook, from NuvoMedia, wouldn't show up on the SoftBook, from SoftBook Press, and vice versa. Each company developed a separate way to format, encrypt, and annotate its publications.

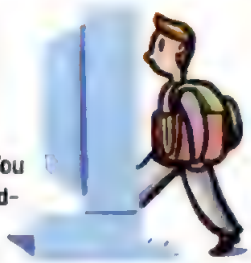
With proprietary systems, publishers that want to strike deals with more than one electronic book manufacturer are faced with the troublesome task of getting their books and magazines turned into several formats. And while exclusive deals might be attractive to the hardware providers, the currently limited market makes an open standard particularly appealing to publishers.

In an unusual move, NuvoMedia and SoftBook Press recently teamed up with Microsoft to create an open standard that lets each manufacturer form and encrypt the material to its own satisfaction without changing the initial format. Several other electronic book companies, publishers, booksellers, and other interested companies also joined the three original members to form the Open eBook Initiative. The companies shared their proprietary technology and information to aid in developing the standard. Members include EveryBook, Glassbook, Librius, Houghton Mifflin, and Barnes & Noble.

The initial version of the standard—a subset of XML—is called the Open eBook Publication Structure 1.0. As we went to press, only SoftBook Press was using the specification.—*Sharon Nash*

ILLUSTRATION BY JEFF NEUMANN

Back to E-School



By Carol A. Mangis

The Internet is a natural forum for learning and teaching. You can now find the online equivalent of almost any brick-and-mortar learning environment: Sites that help elementary school students learn, offer professional training, or enable you to earn a high school or college degree. There are many advantages to learning online, and most of them have to do with economics and convenience. With no physical facility and no commute, online learning is very cost-effective. Some may argue that nothing can replace a classroom environment's direct interaction with a professor and with classmates, but online education can provide millions of people with learning opportunities they might not otherwise have.

Teach Your Children

➤ A wealth of Web sites exist to help kids learn. **MindsEye at Winstar** (*www.win4edu.com/minds-eye/center.html*) offers Web-based projects on which several classrooms can collaborate. For example, at MindsEye Monster Exchange, partnered classes exchange written descriptions of monster drawings via e-mail and the Web, and each group tries to draw the monsters using the other class's descriptions. To help with their language skills, kids can look up word definitions in English, French, German, or Spanish at **Little Explorers** (*www.enchantedlearning.com/dictionary.html*), and then surf to Web sites relating to the words. **Cool Science for Curious Kids** (*www.hhmi.org/coolscience*) uses Web technology to make learning about science facts interactive and fun for kids up to third grade, with experiments and games based on science projects from some of the best museums in the country.

Get Professional Training

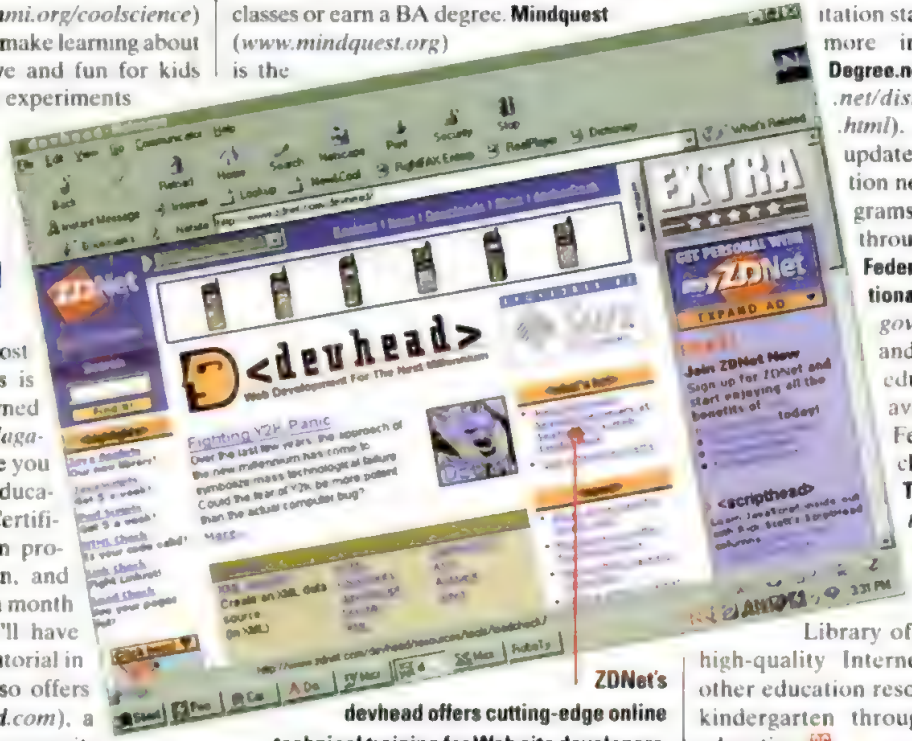
➤ One of the foremost technical training sites is **ZDU** (*www.zdu.com*, owned by Ziff-Davis, *PC Magazine's* publisher), where you can earn Continuing Education Units and ZD Certificates of Completion in programming, Web design, and networking. For $7.95 a month or $69.95 a year, you'll have access to any class or tutorial in the catalog. ZDNet also offers **devhead** (*www.devhead.com*), a resource and online community for Web designers and developers to learn the latest about coding, design, and Internet site management. ZD Education recently launched **welcome.zdu.com** (*http://welcome.zdu.com*), a site dedicated to corporate training. Employees can take more than 250 IT courses for about $79 per person annually or less, with volume pricing.

Earn a Degree

➤ More and more, traditional learning institutions are offering their programs online. The New School has always been an educational innovator; now it offers **DIAL** (*www.dialnsa.edu*), a distance-learning program. At this site, students can take individual classes or earn a BA degree. **Mindquest** (*www.mindquest.org*) is the first online program for teenagers and adults who want to earn a high school diploma issued by a public school. It offers customized courses developed specifically for online education. **Western Governors University** (*www.wgu.edu/wgu/index.html*) offers distance-learning courses from dozens of colleges, universities, and corporations. Through WGU, you can earn degrees by focusing only on the skills and knowledge areas that you need, which the school calls "competency-based" education. **Concord University School of Law** (*www.concord.kaplan.edu*) is the first major institution to offer a Juris Doctorate (JD) degree for online students. And **Duke University's Fuqua School of Business** (*www.fuqua.duke.edu*) offers the Global Executive MBA, which is mostly Internet-based, although it does require a small amount of on-campus time.

Find Educational Resources

➤ The Web is loaded with sites that can help guide you to educational programs and assistance. **Embark.com** (*www.embark.com*) is a great comprehensive resource: You can research schools to find out which ones you'd be interested in attending, then apply to more than 400 schools right from the site. Even better, you can place your own information online and let recruiters find you. To find out about a school's accreditation status and to obtain lots more information, surf to **Degree.net Central** (*www.degree.net/distance-learning/home.html*). You'll find regular updates on the latest education news: new schools, programs, technology breakthroughs, and more. **FREE**, or **Federal Resources for Educational Excellence** (*www.ed.gov/free*), provides lists and links to thousands of educational resources available through the Federal government for children and adults. **The Gateway** (*http://thegateway.org*), sponsored by the U.S. Department of Education's National Library of Education, provides high-quality Internet lesson plans and other education resources for teachers of kindergarten through adult continuing education. PC



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intel inside pentium III

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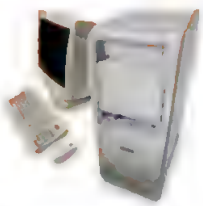

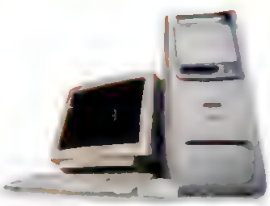

Model Name	Millennia 500	Millennia MAX 600	Millennia MAX 600
Processor	Intel Pentium III processor 500MHz	Intel Pentium III processor 600MHz	Intel Pentium III processor 600MHz
Main Memory	64MB SDRAM	128MB SDRAM	256MB SDRAM
Hard Drive	8.4GB Ultra ATA hard drive	20GB Ultra ATA hard drive`	27GB Ultra ATA hard drive`
Monitor	17" Micron 700Cx (15.9" display)	19" Micron 700Cx (17.9" display)	19" Micron Trinitron® (18" display)
DVD/CD-ROM	40X var.° speed CD-ROM drive	NEW 8X DVD-ROM Drive	NEW 8X DVD-ROM Drive
Graphics	8MB nVidia AGP graphics	32MB nVidia AGP graphics	32MB nVidia AGP graphics
Sound System	PCI 64-voice Wavetable sound	PCI 128-voice Wavetable sound	NEW Aureal Vortex2 SQ2500 audio
Speakers	—	Monsoon MC200 3-piece speaker system	Monsoon MC700 3-piece speaker system
Communication	3Com USRobotics V.90 WinModem	3Com USRobotics V.90 WinModem	3Com USRobotics V.90 WinModem
Micron University	1 year-free` online training	1 year-free` online training	1 year-free` online training
Warranty	5-yr./3-yr. Micron Power limited warranty	5-yr./3-yr. Micron Power limited warranty	5-yr./3-yr. Micron Power limited warranty
Software	Microsoft Windows 98 Microsoft Office 2000 Small Business Suite Norton AntiVirus	Microsoft Windows 98 Microsoft Office 2000 Small Business Suite Norton AntiVirus	Microsoft Windows 98 Microsoft Office 2000 Small Business Suite Norton AntiVirus Micron Easy Internet
Included	3.5" floppy drive	3.5" floppy drive	3.5" floppy drive 250MB Iomega Zip drive
Factory Direct Price	$40.00/mo. Business Lease 48 mos. $1298	$67.00/mo. Business Lease 48 mos. $2192	$87.00/mo. Business Lease 48 mos. $2868

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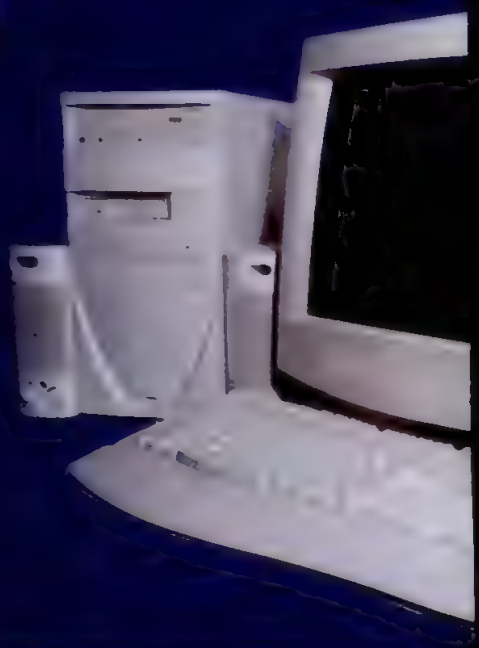

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FIRST LOOKS

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

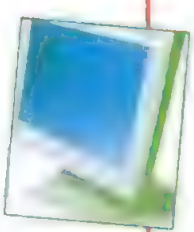
Taking Finances Personally

Microsoft Money has been hot on Quicken's trail for years now. Has it finally overtaken the personal finance giant?

ONE SHARP CAMERA: The sophisticated Sharp Internet ViewCam is a breakthrough ultraportable digital camcorder designed for the Web. *Page 53*

EYE ON GRAPHICS: For technical and business graphics, iGrafx Designer 2000 Suite deserves a close look. *Page 60.*

THIN IS IN: The Acute ThinCast 8525 is an easy-to-install thin client with all the hardware in the monitor. *Page 71.*



By Kathy Yakal

Intuit and Microsoft haven't given their existing personal finance software users many compelling reasons to upgrade this year. And maybe that's good news for consumers. Every other year or so the vendors release upgrades—with tweaks to the interfaces and new features here and there—that don't necessarily need to be purchased. This year, though, Intuit needed to do more than that to keep Quicken a step ahead of Microsoft Money. For years, Money has threatened to unseat Quicken as the best in the personal finance category. This year, Microsoft has succeeded.

As you might expect, some of the changes made in this year's versions relate to Web integration—more on Microsoft's part than on Quicken's. For example, you can now view information stored in Microsoft Money 2000 Deluxe ($65 street) on its companion Web site, MSN MoneyCentral. Enter transactions on MoneyCentral and have them show up in Money 2000. Quicken Deluxe 2000 has added new investment alerts and made background downloading more convenient, among other things.

Each program underwent internal changes—some involved one competitor playing catch-up with the other. Intuit beefed up its planning features to compete better with Microsoft, and Microsoft strengthened its investment tools to counter Intuit's. Quicken Deluxe 2000 may have undergone more interface changes than Money 2000 did this year, but Money's visuals and navigation tools, with only minor changes, have held up well since it was launched in 1995. Both programs, however, continue to break complicated processes down into manageable chunks and consolidate what were previously multistep operations.

The core of each program remains practically untouched, because much of each core already worked, and worked well. Using either, you can maintain your banking records within the program, and you can access accounts and pay bills online. You can make and track budgets and plan for major life events such as retirement and taxes; you can also create and update investment accounts. Both programs give you instant, detailed views of your financial past and present based on internal data and on the pertinent information they pull from the Web.

Quicken has always been easy to use, which explains its popularity in part. Little has been

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Philips Internet TV Classic 60
Sony KL-X9200U LCD Rear Projection Display 64
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Landel MailBug 86
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PHOTOGRAPHY BY MARK SYMPLE

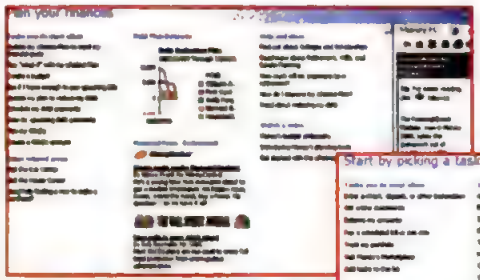
done to the software this year to make it easier, though, for either new users or veterans. The Activity Centers—home pages for each personal finance element—have been redesigned but are still too busy to be effective signposts. Money 2000, on the other hand, stole Quicken's thunder with its new Setup Assistant, which simplifies getting started and provides an action plan for regular use.

Another motivator for using Quicken—the interaction between it and sister product TurboTax—loses some of its power too, this year, as Microsoft introduces its own companion tax product. TaxSaver, announced but not available at this writing, is expected to exchange data with Money 2000 similar to the way Quicken and TurboTax do.

So the question this year (in addition to which program the uninitiated should buy) is not so much whether to upgrade, but whether Money finally offers enough of an edge to convince legions of loyal Quicken users to make the switch.

Microsoft Money 2000 Deluxe

Microsoft finally got serious about its Money personal finance product in 1995, but it has taken the company four years to build a product that would best longtime rival Quicken. Microsoft Money 2000 Deluxe looks and works much like previous versions, but increased attention to tax and investment planning, Internet integration, and setup tools for both new and old users make the software more than an also-ran this year.



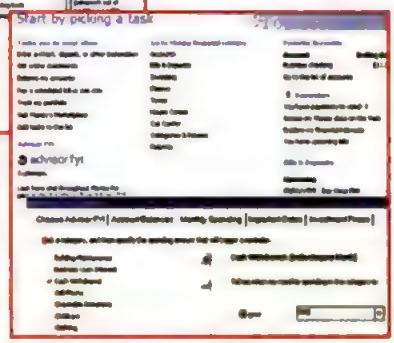
▲ **THE HOME FRONT:** *Every content area of Money 2000—such as Planning—has its own mini-home page.*

Money 2000's new (optional) Setup Assistant adds some up-front time—from 20 minutes to over an hour, depending on how complex your finances are. The program asks a series of questions, helps you import existing Quicken or Money data, and supplies simple forms for entering specifics about your financial accounts, your paychecks, and your bills. Money 2000 also uses the information that you supply to customize its options and information.

One central home page and several additional mini-versions for each financial topic (investing, planning, and so forth) make Money 2000 easy to navigate. You can customize the main home page to include what you want (reminders, common tasks, and bills due, among others), and quickly drill down to the screen you want using links on the Financial Center home pages.

New investment-management and Web-integration tools bring more related data into Money 2000 and help you to analyze that data better. The revamped portfolio tracker offers highly customizable views and supports additional types of investments (bonds and CDs) and transactions such as mergers and splits.

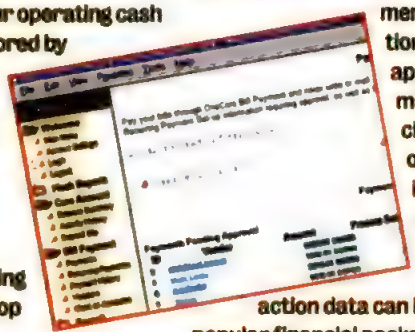
Tighter integration with the Money Central Web site allows you to enter transactions at the site for delivery to Money 2000 and view account balances, upcoming



▲ **RED ALERT:** *Money 2000's Advisor FYI Alerts warn you when balances go below or above a specified amount.*

One-Stop Financial Services Online: OneCore.com

If you're using a personal finance or small-business accounting program to track your income and expenses for your home office or small business, you may get lost in the morass of bank accounts required to manage your cash flow. OneCore.com (*www.onecore.com*) provides an innovative solution. To use the service, you'll have to move your operating cash into one of the money market accounts sponsored by OneCore.com's partners (Federated Investments or Scudder Kemper Investments). The OneCore Financial Network and its additional partners provide banking and bill payment, payroll and 401(k) administration, and credit and merchant services.



Administration of these services, though, flows out of your OneCore.com interest-bearing money market account. Access Control—on top of standard Web security protocol—lets you delegate individual tasks to employees without giving them access to all areas of account administration.

The service uses a Windows Explorer–type navigational system, with an outline of the site's services on the left. Processing and transactional areas contain blank fields, check boxes, and drop-down lists. Links take you to setup areas.

Fees are competitive, as business banking services go, starting at $25 per month for core services, with others available a la carte depending on the number of employees and other factors. For example, Merchant Express, one of the site's newest features, helps you set up and administer a merchant account for receiving transaction payments. Static fees include a $100 application fee, a $50 setup fee, a $15 minimum monthly charge; and a $10 charge-back fee; other charges depend on the options you select. Bill payment incurs a charge of 90 cents per payment. Payroll is $50 down and $5.95 per month, with several additional per-payroll and per-employee fees. Transaction data can be easily downloaded into a number of popular financial packages.

You could certainly patch together all of these services from different sources on your own—working from one central money market account—and possibly bring your total cost down. But OneCore.com's one-stop financial services concept offers appealing convenience and integration.—*K.Y.*

OneCore.com, Woburn, MA; 888-663-2673; *www.onecore.com*.

bill notification, and Advisor FYI Alerts. A similar two-way synchronization exists between your portfolio on Money 2000 and MoneyCentral.

Using the new Purchase Wizard, Money 2000 offers you options for financing a big-ticket item (sell investments, save cash, charge it, and so forth). No matter which path you investigate, Money 2000 warns you both of the pitfalls and outlines the advantages. The program also lays out the financial ramifications precisely, such as displaying monthly payments and interest paid throughout the life of a financial commitment, and it points you to relevant Web resources. Money 2000 supports your financial decisions in this fashion throughout the program.

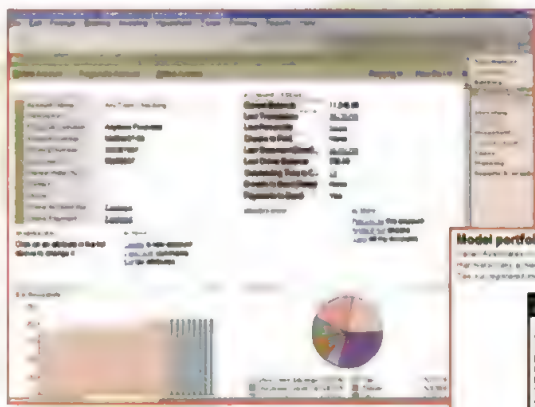
Smaller changes will make your daily tasks easier in Money 2000. You can now enter transactions either on a form or within the register. The new AutoCategorization feature makes an educated guess on categorizing transactions. Money Express does Quicken's QuickEntry one better. Money Express is a small window that operates independently of Money 2000 and lets you enter transactions that are later moved into Money 2000; it also displays reminders of upcoming bills and FYI Alerts. And downloaded statements now appear as scrolling screens, instead of individual dialog boxes.

New startup features, improved investment and planning areas, Web integration, and generally consistent follow-through in most program areas—atop the solid core that it built over the years—make Microsoft Money 2000 Deluxe this year's best. If you're shopping for personal finance software for the first time, consider Money 2000 first. And if you're already using a version of Quicken or Money that's more than a year old, you should give Money 2000 serious consideration as well.

Microsoft Money 2000 Deluxe. Street price: $65. Requires: 16MB RAM; 50MB to 175MB hard disk space; Windows 95, 98, or NT 4.0 or later. Microsoft Corp., Redmond, WA; 800-426-9400, 425-882-8080; *www.microsoft.com.*

Quicken Deluxe 2000

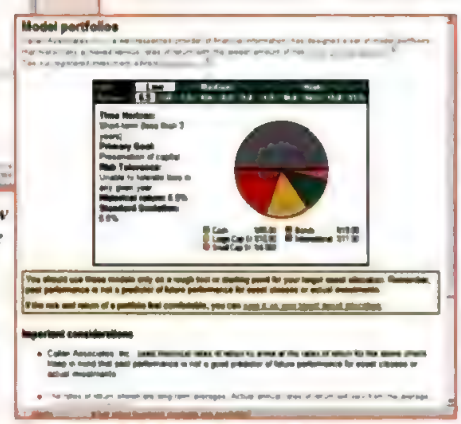
It's with good reason that Quicken has been the enthusiastic choice of millions of PC owners for more than a decade. Originally little more than a check writer, Quicken has evolved into a complex but easy-to-use personal finance center. Quicken Deluxe 2000 adds little in terms of usability, but improves its already excellent tools for tracking investments and planning for taxes and other life events. The software opens a slightly wider pipeline to financial information on the Web and tweaks features that make your finance-related hours more productive.



▲ **PERSONAL AUDIT:** *The new account overview screens in Quicken 2000 give you a bird's-eye view of each account.*

Quicken Deluxe 2000's navigational scheme is similar to last year's: one main home page that's customizable and mini-home pages for each program section. These pages can contain items such as alerts, data from the program itself and the Web (securities quotes, account balances, and the like), links to related activities (account reconciliation, stock or mutual fund research), and charts and graphs. QuickTabs—buttons labeled with areas you visit often—also assist in navigation.

Intuit has made the most changes this year in Quicken Deluxe 2000's planning and investment areas—where the program was already strong—and less than we expected in Internet integration. The company has added four useful investment alerts: insider buys, insider sells, new broker research, and earnings announcements. You can track employee stock options and include them in net worth statements and rebalance your portfolio to keep asset allocation in correct proportion.



▲ **STAYING IN BALANCE:** *One of the new investment tools in Quicken Deluxe 2000 is the asset allocation guide.*

Intuit dropped the elements of its standalone product, Quicken Financial Planner, into Quicken Deluxe 2000's planning module, which makes for a meaty but uneven set of tools. The Planning Center includes step-by-step strategies for such life events as retirement, college, and special purchases.

Changes in the tax planning area are more significant. New tax alerts help avoid last-minute panic. The new Itemized Deduction Estimator lets you play with what-if scenarios, in an attempt to trap every legal deduction possible. And the Tax Withholding Estimator helps determine if you should change the withholdings on your W-4.

Our favorite small change this year was the addition of account overviews. These full-page, bird's-eye views pull together summary graphs, Quicken Deluxe 2000's observations, and links to related tasks. Other changes include a streamlined online account setup procedure, an optimized portfolio view, and the addition of estimated tax payments to scheduled transactions lists.

Quicken Deluxe 2000 also works more in tandem with Intuit's personal finance Web site, Quicken.com, in addition to the new alerts. Tools have been added for more capable portfolio exporting, stock evaluation, and security charting.

Though Intuit pioneered many of the functions that rival Microsoft has implemented, Quicken simply didn't move forward far enough this year to land ahead of Money, as it has traditionally done. Money has caught up in areas where it formerly lagged, moved ahead in Web integration, and provides a more cohesive, integrated user experience. Unless you haven't upgraded for a few years, you might do just as well to stay with your current version of Quicken.

Quicken Deluxe 2000. Street price: $60 (for upgrade, $20 rebate). Requires: 16MB RAM; 33MB hard disk space (33MB more if Internet Explorer 5.0 is not installed); Windows 95, 98, or NT. Intuit Inc., Mountain View, CA; 800-446-8848; *www.quicken2000.com.*

Topping the Charts

Visio 2000 adds Office 2000 compatibility and more to its set of charting and diagramming tools.

By John McCormick

For those looking for a versatile business program to manage teams or plan tasks using charts and diagrams, Visio Corp.'s Visio has long been the tool of choice. Visio 2000 Standard Edition ($199 list, $99 upgrade) can do more than basic graphics software, but it's not as powerful as standalone software solutions such as project management programs.

When you create Gantt charts, for instance, Visio 2000 arranges tasks in the proper order and alters timelines when you change dates; it also alters dates when you drag and drop tasks. But Visio 2000 doesn't do resource leveling. Therefore, the program is not suitable for managing engineering or construction projects but is a perfect fit for many office tasks such as product launches—where assigning rigid timing or even dependence to all tasks is seldom possible.

Visio 2000 offers support for Microsoft Office 2000 and produces flowcharts, organization charts, project management Gantt and PERT (Program Evaluation and Review Technique) charts, calendars, workflow diagrams, maps, and basic office and network layout charts—each from a different template. An unusual feature is the mind chart, a flowchart, helpful for brainstorming sessions.

The software gives you the ability to open and display multiple, editable windows showing different chart types. You can modify an organization chart while viewing an office layout diagram and even drag-and-drop or link items between different charts. The program is highly object-oriented but retains the ability to do some tasks by importing text-based data to automate the creation of some diagrams.

The product also has strong Internet and intranet support, including the option to save diagrams in HTML format and in the Vector Markup Language used by Microsoft Word 2000. VML lets viewers navigate through multipage diagrams using Microsoft Internet Explorer 5.0.

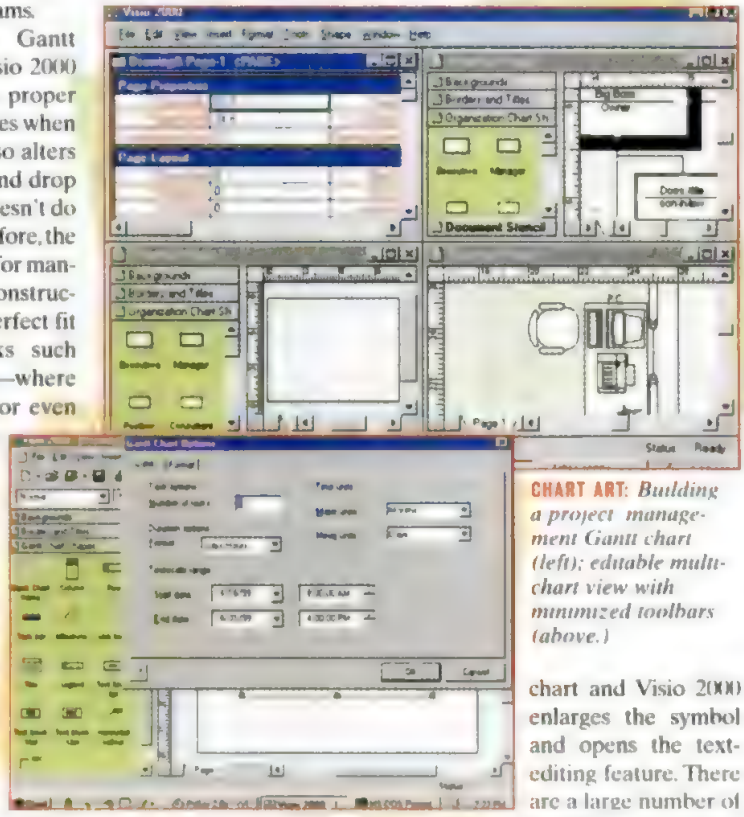


CHART ART: *Building a project management Gantt chart (left); editable multichart view with minimized toolbars (above.)*

Full Speed Ahead

Many of the changes in this version enhance ease of use and speed chart design. The program opens with a screen displaying recently used files and a list of the various chart types for creating new documents, which is quite useful; you will almost always want either to open an existing document or to use one of the basic templates. Minor improvements from the previous version include new borders, backgrounds, color schemes, and chart titles.

Some users felt that the workspace in earlier versions was too crowded. Toolbars are now simpler and can be relocated or closed. A multilayer object and background window on the left makes it simple to see just the group of icons you need at a specific time, yet you still have easy access to other categories.

Editing objects is straightforward; just click on an icon in a chart and Visio 2000 enlarges the symbol and opens the text-editing feature. There are a large number of objects with different selections for each chart type, and you can also create new objects. Keeping track of what each small icon represents is simplified by a pop-up description that appears when you rest the cursor on an object.

Just as the work area has many concealed tools only a mouse click away, Visio charts can be far more complex than they first appear. Many objects are associated with dialog boxes where you can enter information such as an employee's name and job title for an organization chart or a computer's serial number in an office layout chart. You can also hyperlink objects to other objects, other charts, files, and even Web pages. Hyperlinks don't clutter up the presentation charts and are only indicated by a new symbol when you place the cursor on the object.

Getting Started

Installation is unusual, because the program first updates Windows and then restarts the computer before installing the software. The entire process took 10 minutes but required little user intervention.

Visio 2000's help system is HTML-based; it offers a search feature, a table of contents, and an index. The program comes with limited print documentation, however, so the help system could be more thorough; some terms such as "cross-functional" are essentially undefined.

For example, plenty of information is supplied about how to create a cross-functional flowchart, but we had to do some research to learn what this meant. The help section has hot links for many items, but in this instance, all you get as a general example of a cross-functional chart is a basic flowchart with some colored bands.

Advanced users will appreciate the built-in Visual Basic editor, which lets you customize the program. Visio 2000 also supports ActiveX, and users can edit or add custom properties to new or existing objects. Visio 2000 Standard Edition offers complex tools for the expert but is simple enough for beginners to become productive quickly.

Visio 2000 Standard Edition. List price: $199; upgrade, $99. Requires: 16MB RAM (Windows 95/98), 24MB RAM (Windows NT); 80MB hard disk space; Windows 95, 98, or NT. Visio Corp., Seattle; 800-248-4746; *www.visio.com.*

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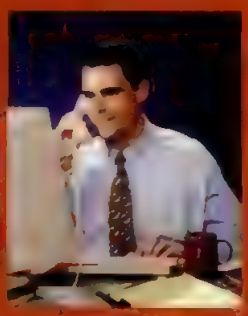

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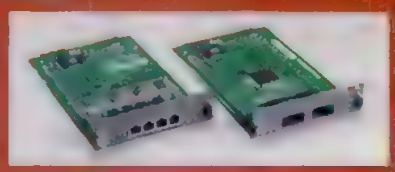

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The Web as a Post Office

The USPS has approved Internet-based postage, and several companies are ready to deliver it.

By Bruce Brown, Marge Brown, and Kathy Yakal

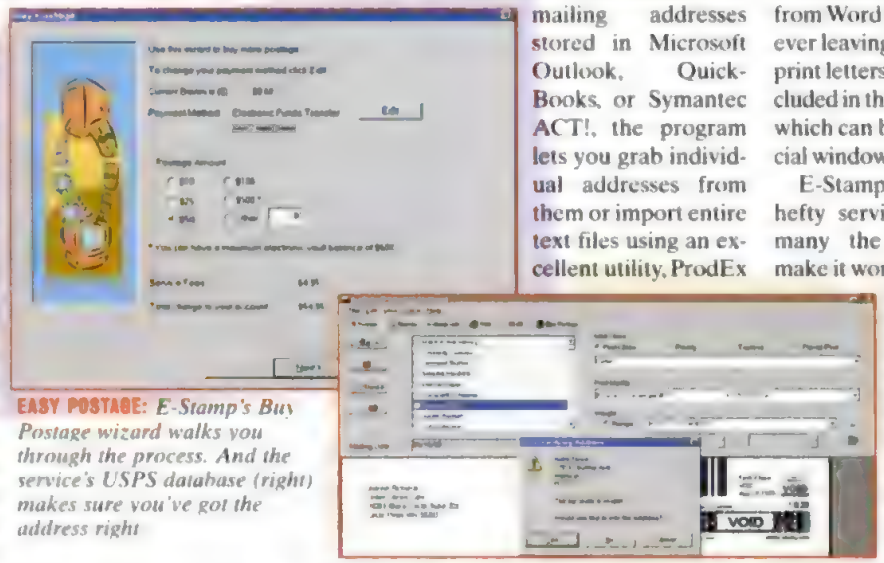
So it's come to this, a few short years after the World Wide Web opened its doors: Your PC can now spit out postage almost as fast as those stamp machines in the post office can. No more long lines waiting to buy stamps or have a parcel weighed and metered.

Four products recently approved by the USPS can produce an *indicia* (the digitally encoded bar code that represents postage on metered mail) on envelopes, labels, and letters. Instead of sticking a stamp on your letters and parcels, you can now set up an account with an approved postage vendor, download "postage" from the Internet, and print the indicia using your existing laser or ink jet printer.

Two of those products are currently in national distribution and are reviewed here: E-Stamp and Stamps.com. Both come with software designed to help you apply for your own postage license with the USPS, arrange for funds withdrawal from your bank account to pay for postage, and manage your address database. The software also lets you designate the amount of postage for each letter or parcel, as well as the printing format, and offers a test run to avoid spoilage. Two other companies, Neopost and Pitney-Bowes, have similar products in beta test (see our sidebar, "Up and Coming E-Mail Postage Solutions.")

Whether you choose to try out one of these new systems may depend at least in part on the convenience (or lack thereof) offered by your local postal branch, because you'll pay more for the privilege of printing your postage—at least as much as 10 percent beyond the actual cost of the postage. You may also have to pass yet one more plug through existing pass-throughs on your overloaded parallel port.

Still, a lot can be said for the convenience of these new personal postage systems. If time is indeed money in your business or personal life, you may make up the extra fees by saving the minutes or hours you spend in line at the post office. And you can wave merrily at the long lines of patrons as you drop your mail in the metered box and go on your way.



EASY POSTAGE: *E-Stamp's Buy Postage wizard walks you through the process. And the service's USPS database (right) makes sure you've got the address right*

E-Stamp

E-Stamp and Stamps.com have three primary differences. E-Stamp requires additional hardware—an "electronic vault," which is a small metal box about the size of a roll of stamps that plugs into the PC's parallel port. Since the postage is stored in this hardware vault, you don't have to be connected to the Internet to use postage. Finally, E-Stamp's service fees are lower.

The E-Stamp start-up kit ($49.99 list) comes with $25 worth of free postage, system software and hardware, and the required Address Match CD, which verifies U.S. mailing addresses. You can use the main system software (which is easier to use than many postal forms) to address and affix postage to envelopes, postcards, and packages—at First Class, Priority, Express, or Parcel Post rates.

You can print on labels, envelopes, and self-seal mailers and enter either an exact weight or a range (an optional scale is available). If you already have mailing addresses stored in Microsoft Outlook, QuickBooks, or Symantec ACT!, the program lets you grab individual addresses from them or import entire text files using an excellent utility, ProdEx Figure It (included). Or you can build your own address book.

The program's main screen features a window that displays the return and recipient addresses, as well as the postage as it will print. One toolbar button keeps a running tally of how much postage you have left, and others take you to reports, an address-check function, and the Buy Postage wizard on the Internet. Using the latter, you can buy up to $500 of postage at one time, with a 10 percent "convenience fee" (minimum fee, $4.99; maximum, $24.99). Postage can be purchased using an electronic funds transfer from your bank.

Whether you're printing postage directly on an envelope or on a label, you'll be able to print a test sample first to check alignment. If you print postage for the wrong amount, if printed postage is no longer needed, or if the envelope or label gets damaged, you'll be able to get credit for it by filling out an enclosed form (in PDF format) and mailing it to E-Stamp Corp. Your posted letters and parcels must be mailed on the day stamped on the indicia (you can change a date if you haven't yet printed the stamp).

E-Stamp's integration with Microsoft Word lets you print envelopes containing postage from Word documents, without ever leaving Word. You can also print letters with the postage included in the upper-right corner, which can be mailed using special window envelopes.

E-Stamp's 10 percent fee is a hefty service charge, but for many the convenience can make it worthwhile.

E-Stamp. List price: $49.99 for starter kit; 10 percent service fee on postage. Requires: 16MB RAM; 19MB hard disk space (with Microsoft Internet Explorer installed); Microsoft Windows 95, 98, or NT; 300 dpi or better laser or ink jet printer. E-Stamp Corp., San Mateo, CA; 888-437-8267; *www.e-stamp.com.*

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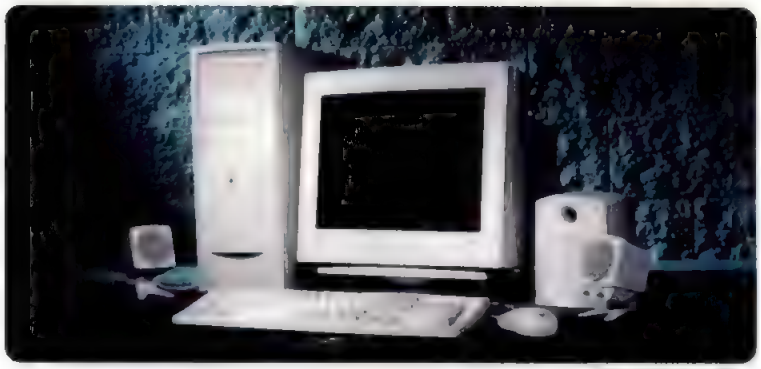

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1-Year gateway.net® Internet Access' - $129
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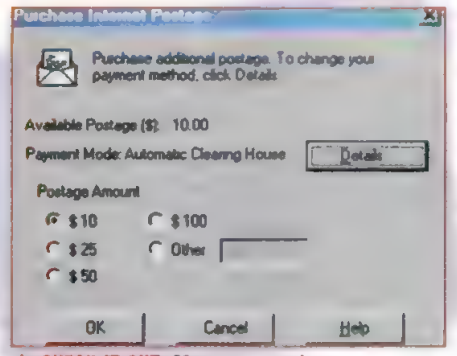
Most laser and ink jet printers are compatible with Stamps.com for printing postage and addresses directly on labels and envelopes. Stamps.com's indicia postage format includes a bar code to speed delivery.

The USPS has approved Internet registration of 10,000 nationwide users for Stamps.com's start-up in September, with unlimited availability expected later this year. You can download the program and purchase a batch of postage within 10 minutes. You must enter the weight of your mailings in the Stamps.com program, which computes postage based on the latest USPS rates; an integrated electronic scale is under development.

You can simultaneously print postage and addresses on envelopes with a single print command or separately on two labels for packages. Fortunately, Stamps.com includes a test print feature to use before printing real postage, because if you make a mistake when printing postage, you cannot get a refund or credit. Our envelope test prints, using a Hewlett-Packard LaserJet Series II, produced business-quality results with perfectly aligned addresses and postage.

Although the software is easy to use, the payment plans are complex. You are charged for postage at the time of purchase, and you can hold up to $500 worth of postage in your account at any one time. Monthly usage fees are charged as you print postage. You can choose from two usage plans: Personal and Business.

With the Personal plan, you pay $1.99 a month (or $19.99 for 12 months) for up to $25 in postage printed per month, with a 15 percent usage fee for printing over $25 worth of postage. The Business Plan has a minimum monthly fee of $3.99 for up to $40 in postage printed, with a 10 percent fee for additional usage. Both plans have a monthly usage fee cap of $19.99. Stamps.com charges your credit card or bank account monthly for postage purchases and usage and sends an e-mail confirmation.



▲ **CHECK IT OUT:** *You can purchase Stamps.com Internet Postage with an electronic funds transfer from your savings or checking account.*

Stamps.com integrates with word processors (Corel WordPerfect 8.0 and Microsoft Word 97) and PIMs (Lotus Organizer 5.0, Microsoft Outlook 97/98, Outlook Express, Symantec ACT! 4.0, and Windows Address Book). Some extras include the ability to add logos to indicia postage, logs of postage purchased and printed, address reformatting using postal abbreviations, and ZIP-plus-four coding.

Aside from the overly complex pricing plans, Stamps.com Internet Postage lives up to its promise to deliver a simple, hardware-free solution for the Internet age. **Stamps.com Internet Postage.** Direct price: Postage, plus monthly usage fee ranging from $1.99 to $19.99. Requires: 16MB for Microsoft Windows 95 or 98, 24MB RAM for NT 4.0; 4MB hard disk space; 300 dpi or higher Windows-compatible printer. Stamps.com Inc., Santa Monica, CA; 888-434-0055; *www.stamps.com.*

Up-and-Coming E-Postage Solutions

Two other companies poised to be major players in PC-based postage, Neopost and Pitney Bowes, will have products available at the end of this year or early next year. The offerings, Neopost's PC Stamp and PostagePlus and Pitney Bowes' ClickStamp Plus and ClickStamp OnLine, will include printing First Class, Express Mail, and Priority Mail postage and U.S. addresses with standard ink jet or laser printers. Pricing and payment methods are under development at both companies.

Neopost's PC Stamp will be an integrated hardware and software product for those who don't want to connect to the Internet whenever they need to print postage. You'll be able to buy postage 24 hours a day, seven days a week via the Internet, download it, and store it in a wallet-size vault that connects to your PC's serial port.

The PC Stamp program will work with Neopost's digital scale to read the weight of envelopes and packages and calculate exact postage. You'll be able to print postage with logos and marketing text and addresses directly on envelopes or labels. You'll also get usage reports, mailing list management, and verification of addresses and ZIP codes.

PostagePlus is Neopost's software-only product that will provide for downloading postage from the Internet as needed. You'll weigh mailings on the integrated scale, connect to Neopost's secure server, input mailing information, and download exact postage.

Those who are not frequent Internet users are potential users of ClickStamp Plus from Pitney Bowes. ClickStamp Plus will use a small hardware component, a Postal Security Device, which connects to a computer's serial port. The device will store prepaid postage downloaded via a PC modem from Pitney Bowes' Postage by Phone system. The ClickStamp Plus program will calculate and print the correct postage on envelopes and labels. The program also will manage multiple address books, import and export mailing lists, produce usage reports, integrate with word processing and PIM applications, and verify addresses with an included database.

Pitney Bowes' ClickStamp OnLine will download postage from the Internet on an as-needed basis. No free serial port is needed for this software-only postage solution. It provides the same features as the ClickStamp Plus program, except that address verification is done from the Pitney Bowes' server—no CD is required.—*BB*

PC Stamp and PostagePlus. Neopost, Hayward, CA; 800-637-0760; *www.pcstamp.com* or *www.postageplus.com.*

ClickStamp Plus and ClickStamp OnLine. Pitney Bowes Inc., Stamford, CT; 800-446-8408; *www.pitneybowes.com.*

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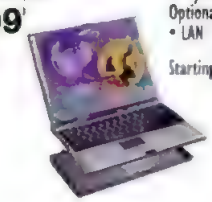

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- Pioneer bass reflex stereo speakers
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- Wireless IR mouse receiver
- Removable Lithium ion battery
- Microsoft Windows 98 SE
- 1-year International Limited Warranty[2]

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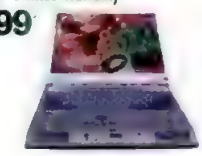

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Web Video for Anyone

The Sharp Internet ViewCam makes capturing still images and video for the Web easy.

By Daniel Grotta and Sally Wiener Grotta

Announcing a breakthrough: The Sharp Internet ViewCam ($699 list) is the first of a new breed of ultraportable still/video digital cameras designed to output to the Internet. The ViewCam is sure to be a hit with anyone who wants a low-cost, easy-to-use portable camcorder for Web display.

As a Web camera, the ViewCam's resolution is limited to 320-by-240 or 160 by 120 pixels; in still mode, the camera shoots VGA (640-by-480) images. It has a 1.8-inch LCD viewfinder that's difficult to see in bright light. The lens has a fixed focal length but swivels 180 degrees and features both a 4X digital zoom and a macro switch.

Among the few user-selectable options are automatic or manual white balance, backlighting, and variable time exposure settings. You'll find no flash, exposure-compensation, or manual controls for still shots, and the ViewCam lacks image stabilization for jitter-free recording.

The ViewCam is the first DV video camera to incorporate MPEG-4 data compression, which produces files that are about two-thirds smaller than files compressed under MPEG-1. MPEG-4 lets the ViewCam shoot up to 2 minutes of video per megabyte.

Instead of recording on tape, the ViewCam saves to reusable, wafer-size SmartMedia cards, so you can instantly search, edit, display, and replay saved clips. Depending on resolution and compression levels, the 8MB SmartMedia card that ships with the camera can capture between 2.5 and 34 minutes of video, 72 or 144 still images, or any combination. Sharp includes a FlashPath floppy disk adapter for file-to-file transfer.

The ViewCam is pure fun to operate: Turn it on, point the lens, and start shooting. The status LCD shows battery life, time elapsed, and time remaining. The easy-to-understand menu makes changing resolutions and compression levels simple. Video and audio quality aren't great, but they're good enough for most Web applications.

Thumbnails display up to nine shots at a time, and pressing the shutter plays the recorded clip or still. The camera's tiny speaker makes it difficult to hear clearly, but the sound is significantly better when played on a PC. Video clips are saved as ASF files.

Compact size, sophistication, and ease of use will make the Sharp Internet ViewCam an instant favorite of families, students, and SOHO users who want to communicate visually over the Web. **Sharp Internet ViewCam.** List price: $699. Requires: 32MB RAM, 140MB hard disk space, Internet Explorer 4.01 or higher, Windows 95 or 98. Sharp Electronics Corp., Mahwah, NJ; 800-237-4277; *www.sharp-usa.com.*

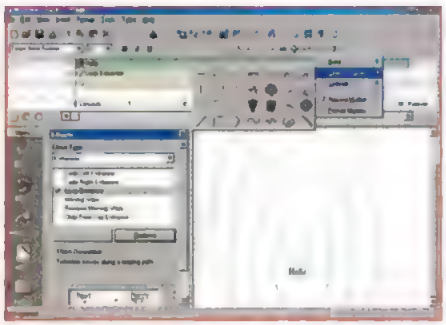
▶ **TAKE IT ALONG:** *The Internet ViewCam is portable and point-and-shoot easy to use.*

Pump Up Your Web Pages

Microsoft's new Web page editor, Vizact 2000, lets anyone add dynamic and interactive effects.

By Edward Mendelson

The latest member of the Office 2000 family, Microsoft Vizact 2000 ($150 street) is a Web page editor with an eye toward dynamic and interactive effects. Technically, Vizact is dazzling, and it makes dynamic effects far easier to create and modify than they are in any other Web page editor. The catch is that the effects are compatible only with Internet Explorer 5.



▲ **THROW A CURVE:** *Vizact supplies predrawn or customizable curves for dynamic motion effects.*

Vizact's effects are based on the HTML+TIME specification developed by Microsoft, Compaq, and Macromedia. Currently, there is no open standard for creating Vizact-like effects such as expandable outlines, shrinking and expanding text, pop-ups, animated smoke, fades, and more. These effects resemble JavaScript effects that can be created in advanced HTML editors such as Macromedia's Dreamweaver. Vizact, however, offers a more intuitive interface, superior graphics-import features, and a wider range of effects.

Unlike almost all other Web page editors, Vizact does not give you access to the underlying HTML code. All editing is done in a WYSIWYG screen using the same text and drawing tools available in other Microsoft Office 2000 applications. A wizard builds four sample pages in a variety of styles and color schemes, and you can modify them to suit your needs. You can also open any existing HTML page or build a new page from scratch.

When working with existing pages, you'll find it easy to create a collapsible outline effect by selecting a paragraph of text and adding an "interactive bullet" from the toolbar.

Images and text boxes can be made to fade in, slide down, spin, loop-the-loop, or change size or color either according to a time line or in response to a user's mouse actions. Prebuilt spirals and other curves are available for motion effects.

Although its effects are impressive, Vizact has some notable limitations. You can't save custom effects or their associated effects and motion paths for reuse.

At this point, Vizact feels more like a technical experiment than a useful production tool. Nonetheless, the product shows promise, and Microsoft deserves credit for putting dynamic Web effects within the reach of average users.

Microsoft Vizact 2000. Street price: $150. Requires: 24MB RAM for Windows 95 and 98, 36MB RAM for NT Workstation; 80MB to 115MB hard disk space. Microsoft Corp., Redmond, WA; 800-426-9400; *www.microsoft.com/vizact.*

PHOTOGRAPHY BY THOM O'CONNOR

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*For more information, see www.hp.com/windows2000/desktop. **Price is estimated street price. Actual price may vary. Monitor not included. Intel, the Intel Inside Logo and Pentium are registered trademarks and Celeron is a trademark of Intel Corporation. ©1999 Hewlett-Packard Company. All rights reserved

USB Video Cameras

Three new USB digital video cameras offer better performance, features, and software.

By Bruce Brown, Marge Brown, and Carol Mangis

Are you looking for a quick and easy way to capture and send video e-mail or to grab a quick still shot to post on the Web? New versions of inexpensive video cameras from Eastman Kodak, Logitech, and 3Com—all of which connect via USB ports—present a range of choices, whether you want a low-budget CMOS-based camera or a more costly but higher-performance CCD camera. All three cameras installed quickly and easily, all can capture still images as well as video sequences, and all come with a variety of useful software.

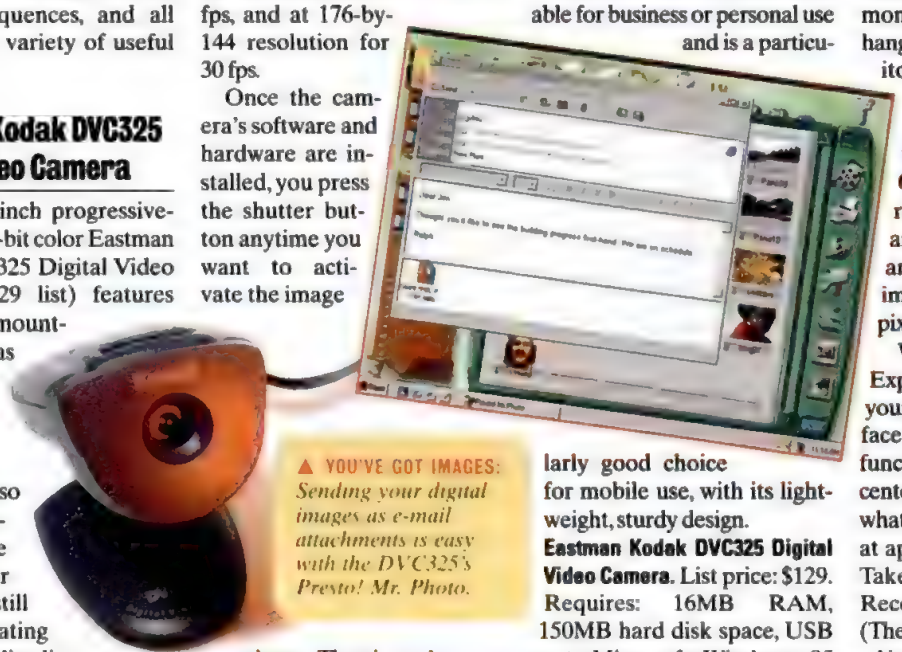
Eastman Kodak DVC325 Digital Video Camera

The quarter-inch progressive-scan CCD, 24-bit color Eastman Kodak DVC325 Digital Video Camera ($129 list) features convenient mounting options as well as automatic and manual image settings. You'll also get a complete software bundle for capturing still images, creating video and audio clips, sending video e-mail, and holding videoconferences.

The DVC325 has a detachable base with a tripod mount and a 9.5-foot integrated USB cable. With its sturdy rubber-covered base, the camera rests firmly on a desktop or monitor. Without the base the DVC325 weighs only 2.4 ounces—a handy size to pack with your notebook. A thumbnail-size disk with an adhesive panel is included for mounting the camera on a notebook or flat panel screen.

On the top of the camera are a shutter button and a focus wheel for adjusting the lens, which has a focus range from 4 inches to infinity. You can control the shutter button and color characteristics with the included DVC325 application or set the camera to operate with automatic white balance and automatic exposure. The image sensor works at 640-by-480 resolution when set to capture 8 video frames per second, at 352-by-288 resolution for 20 to 25 fps, and at 176-by-144 resolution for 30 fps.

Once the camera's software and hardware are installed, you press the shutter button anytime you want to activate the image viewer. The viewer's menu is limited to taking a picture, recording and pausing a video, selecting resolution, and adjusting image settings. As you take pictures, the images display in the DVC325 application, which provides thumbnail or page viewing and several annotation options, including drawing, highlighting, adding text, and adding a virtual rubber stamp to your images. For example, you can add a date, time, and subject line with a "Proof" stamp to your images.



▲ YOU'VE GOT IMAGES: *Sending your digital images as e-mail attachments is easy with the DVC325's Presto! Mr. Photo.*

In testing we found the DVC325 easy to install and operate. Its lens has a flexible 75-degree tilt range and captures clear images with lifelike color whether in a stationary position or hand-held.

Bundled software includes Microsoft NetMeeting and NeoSoft Technology Corp.'s Presto! Video Works and Presto! Mr. Photo. The camera also works with other Twain-compliant applications. For videoconferencing or audio recording, you need a microphone, a 16-bit sound system, and speakers or headphones. Videoconferencing requires a modem and an Internet connection.

The DVC325 is equally suitable for business or personal use and is a particularly good choice for mobile use, with its lightweight, sturdy design.

Eastman Kodak DVC325 Digital Video Camera. List price: $129. Requires: 16MB RAM, 150MB hard disk space, USB port, Microsoft Windows 95 OSR-V2.1 or 98; Eastman Kodak Co., Rochester, NY; 800-235-6325; *www.kodak.com.*

Logitech QuickCam Express

Perhaps you've been thinking about getting a Web video camera for home use, but price or complexity daunts you. The Logitech QuickCam Express ($50 street) can put those fears to rest. This CMOS-based camera with 24-bit color was developed specifically with ease of use and affordability in mind. You can take pictures, record videos, and create simple animations, then save them or e-mail the results with one mouse click.

To start using the QuickCam Express, load the QuickCam software and configure the e-mail and microphone settings. Microsoft NetMeeting is also installed during setup; it's compatible with all versions of the Logitech QuickCam units. The software prompts you to plug the camera into your PC's USB port, and you're ready to start shooting.

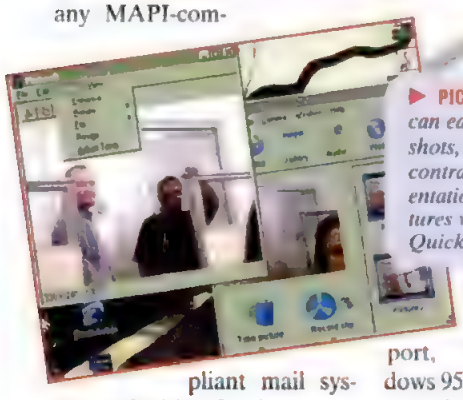
The small, eyeball-shaped camera is built to perch on a triangular base on top of your monitor; the base has a lip that hangs over the edge of the monitor for better stability. You can also remove the camera and aim it to take pictures or videos. The QuickCam Express has a focal range of 6 inches to infinity and a 43-degree viewing angle, and it produces color images of up to 352 by 288 pixels.

When you open QuickCam Express's software program on your PC, you see a simple interface that lets you use all the functions of the camera. In the center of the window is a screen; whatever the camera is pointing at appears here. You can press Take Picture for a still shot or Record Clip to make a video. (There's no microphone included in the package, but the Audio Tuning Wizard helps you set up your own microphone to work with the program.) The Camera drop-down menu provides access to the Animation Wizard, which takes you through the steps of creating a simple animation, either by clicking to each new frame manually or in time-lapse mode.

Anything you create with QuickCam Express can be e-mailed right from within the

PHOTOGRAPHY BY THOM O'CONNOR

program; you simply select the picture or video clip you want to mail and then click on the V-Mail button. This works with any MAPI-compliant mail system and with AOL (a concession to the large number of AOL subscribers). You can also select saved files and send them as attachments.



▶ **PICTURE THIS:** *You can easily edit your still shots, by modifying contrast, brightness, orientation, and other features with the Logitech QuickCam Express.*

The QuickCam software gives you plenty of options for changing color settings and saturation, brightness, contrast, size, and more. You can also crop and resize still pictures and edit your videos. Another useful feature lets you drag pictures or videos and drop them to other applications.

One area in which we'd like to see improvement is documentation; you get only a quick-start guide in the box, and on-screen help is sparse in some areas. For example, we couldn't find any option for changing our default mail system, nor did any area in Help address this. Although you can click to an online help Web site from within the QuickCam Express interface, there isn't much more to be found there, although Logitech is adding to the online documentation as customer feedback comes in.

Altogether, we found the Logitech QuickCam Express fun and simple to use. And it's a terrific bargain. With this camera's low price, family members and friends who live apart can all buy QuickCams and stay in touch visually over the Internet.

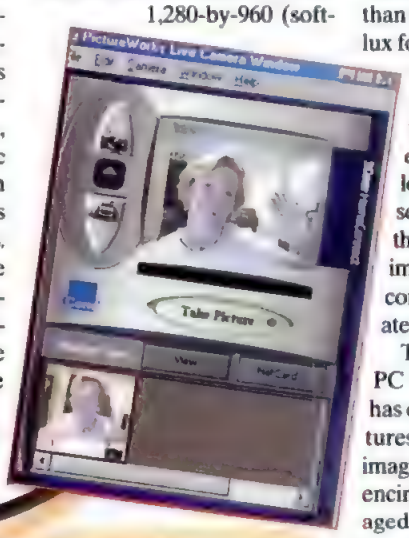
Logitech QuickCam Express. Street price: $50. Requires: 16MB RAM, 50MB hard disk space, USB port, Windows 95 (with Revision B or C and with USB supplement) or Windows 98. Logitech Inc., Fremont, CA; 510-795-8500; *www.logitech.com*.

3Com HomeConnect PC Digital Camera

3Com's 24-bit color CCD-based camera, the 3Com HomeConnect PC Digital Camera ($130 street), is targeted for home or business-based videoconferencing, still image capture, and video creation. Its image-management application, HomeConnect ViViewer, is bundled with Internet-centric software with an emphasis on multimedia communications through e-mail and Web sites. Though not bargain-priced like the QuickCam Express, HomeConnect's automatic light adjustment, rapid video capture capability, and bright image quality justify its cost.

The HomeConnect includes a 9.5-foot detachable USB cable. The camera's software and hardware install with the ease typical of USB peripherals, with the aid of a helpful Quick Installation Guide. For mobile use you can detach the camera from its cable, pack only the camera, and reconnect it to an available USB cable on another computer. No connector is currently available from 3Com for notebook PCs (although such a connector and extra lenses are under development).

The HomeConnect's removable, manual-focus 6.5mm lens provides a sharp image with a focus range of 1 inch to infinity. You focus the camera by turning the lens. A small button on top of the camera captures still images. The HomeConnect's CCD sensor captures images in seven resolutions—from 128-by-96 to 1,280-by-960 (software-enhanced). At its highest video capture rate—60 color fps at 76-by-144 resolution—the HomeConnect is rated twice as fast as the DVC325, which is rated at 30 fps. At 640-by-480 resolution, 3Com reports video capture performance up to 12.1 fps, compared with Kodak's 8 fps at the same setting.



▲ **PC SHOE BOX** *You can store captured images in the HomeConnect's Preview area.*

The HomeConnect's software launcher provides easy access to video tools and e-mail postcard templates. The software suite includes Picture Works Technology's PictureWorks Live for still-image and video capture, PictureWorks NetCard for video e-mail, Microsoft NetMeeting, Kolban's Webcam 32, and Real Networks' G2 Player for streaming audio and video. What's Hot, a launch button, downloads software updates and digital imaging tips. Internet access and a modem are essential for videoconferencing and Internet applications.

One of the camera's most distinguishing features, automatic light-level adjustment, is heads above the other tested cameras' abilities to capture images in low-light settings. The HomeConnect camera is rated to operate at less than 1 lux (compared with 200 lux for the Kodak camera), and our testing proved the 3Com to be superior in this regard. We aimed the camera under a desk with very low lighting, and within a few seconds it favorably adjusted the light level in the on-screen image. The Kodak unit, by contrast, was unable to operate under such conditions.

The 3Com HomeConnect PC Digital Camera not only has competitive hardware features to support high-quality image capture and videoconferencing but is also cleverly packaged with interesting software to support users in their quest to integrate digital images with Internet communications.

3Com HomeConnect PC Digital Camera. Street price: $130. Requires: 32MB RAM, 29MB hard disk space, USB port, Microsoft Windows 95 OSR/2 (950b with USB supplement) or 98. 3Com Corp., Santa Clara, CA; *www.3com.com/video*.

Get the skinny.

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  - Triple-capacity **PCGA-BPZ52**: $399.99
  - Standard **PCGA-BPZ51**: $199.99
- Port Replicator with i.LINK **PCGA-UPR5**: $99.99
- Monitor Adapter **PCGA-DA5**: $49.99
- AC Adapter **PCGA-AC5Z**: $99.99

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The Web on Your TV

Philips and Microsoft present an affordable choice for Internet viewing and e-mail on your TV.

By Bruce and Marge Brown

For Internet access and e-mail without a computer, Philips Electronics and Microsoft offer an inexpensive solution—the Philips Internet TV Classic service ($100 street, plus $21.95 per month service fee). A faster modem (56K and V.90) and built-in printer port are welcome upgrades from Philips' previous model; and Microsoft WebTV provides Internet access for up to six users with separate e-mail addresses. The ease of setup and convenience of this hardware/software combination are a good fit for nontechnical consumers, but the lack of storage is a deterrent to serious Web surfers.

The small set-top box houses a 150-MHz, 64-bit MIPS RISC processor and includes four connectors: audio and video cables to connect to your TV or VCR, an RJ-11 phone cord, and a power cord. An uncomplicated remote control manages WebTV functions.

▲ **KEY ACCESSORY:** *The optional Philips Wireless Keyboard for WebTV is a must for serious surfing and e-mail.*

From WebTV's home page, you can easily access e-mail, favorite Web sites, a search facility, and chat rooms. Submenus display TV listings, news, sports, entertainment, money, shopping, and local information. Screens are busy with ads and service announcements, but the general effect is pleasant.

Web pages are reformatted for TV viewing, with graphics quality that's acceptable for personal use but not comparable to most PC graphics. Audio quality does not equal average radio quality.

The WebTV network provides 26,000 local-access numbers. If you are in an area where you'd have to make toll calls, you can use your own ISP, and the monthly service rate is adjusted to $11.95 per month. The system includes automatic online software updates and call-waiting integration.

Because you have to scroll to input each letter, the online keyboard is barely adequate for even entering URLs. An optional accessory, the Philips Wireless Keyboard for WebTV ($50 street) is practically essential. Supported printers include 17 Hewlett-Packard DeskJet models and 11 Canon BubbleJet models.

This joint offering is good for introducing e-mail and Internet access to noncomputer users and expanding Internet access in the home without buying a second computer.

Philips Internet TV Classic. Street price: $100 plus $21.95 per month service fee. Requires: Television, with audio and video jacks; RJ-11 telephone jack. Philips Electronics, Sunnyvale, CA; 888-813-7069; *www.webtv.philips.com.*

Pro-Level Illustration

iGrafx Designer 2000 Suite is a robust package for creating technical and business graphics.

By Daniel Grotta and Sally Wiener Grotta

Part of Micrografx's iGrafx family of products, iGrafx Designer 2000 Suite ($399 list) contains new versions of the company's long-established programs for illustration (Designer 8.0) and image editing (Image 1.0, formerly Picture Publisher), plus iGrafx's Share Media and Share Viewer. This is a powerful package for creating print and Web output, with a focus on pro-like tools for business.

Fitting into a niche between CAD and creative illustration, Designer 8.0 now has tools that provide even greater precision for technical and business graphics. On initialization, you can choose from templates that conform to standards for ANSI, DIN, ISO 5457, architecture, and engineering, as well as graph paper.

New options include highly customizable shapes and transparency fills. The new Object Explorer provides necessary control over objects, layers, and pages. Options now include radial, angular, volume, area, and perimeter dimensioning. Unlike the other measurements, volume, area, and perimeter do not update as the drawing is edited.

In addition to the QuickVector ActiveX plug-in, Designer 8.0 also has a new Java export to the Web. The Java applet lets you view, search, zoom, and show different layers of documents; it even has a measuring tool for distances.

▶ **CONTROL FREAK:** *Object Explorer (right) provides complete control over objects, layers, and pages.*

Image 1.0 is the first incarnation of new base code for the old Picture Publisher interface, but the upgrade is less a major overhaul than a handful of improvements that increase compatibility and conformity to professional standards.

Editing in the new Channels Manager and Mixer deepens the level of image-detail control. Image supports the editing and saving of 16-bit gray-scale, 48-bit RGB, and 64-bit CMYK files. Curves created using the new Bezier curve tool can be exported as AI files or EPS clipping paths. And multiple levels of Undo and Redo are supported.

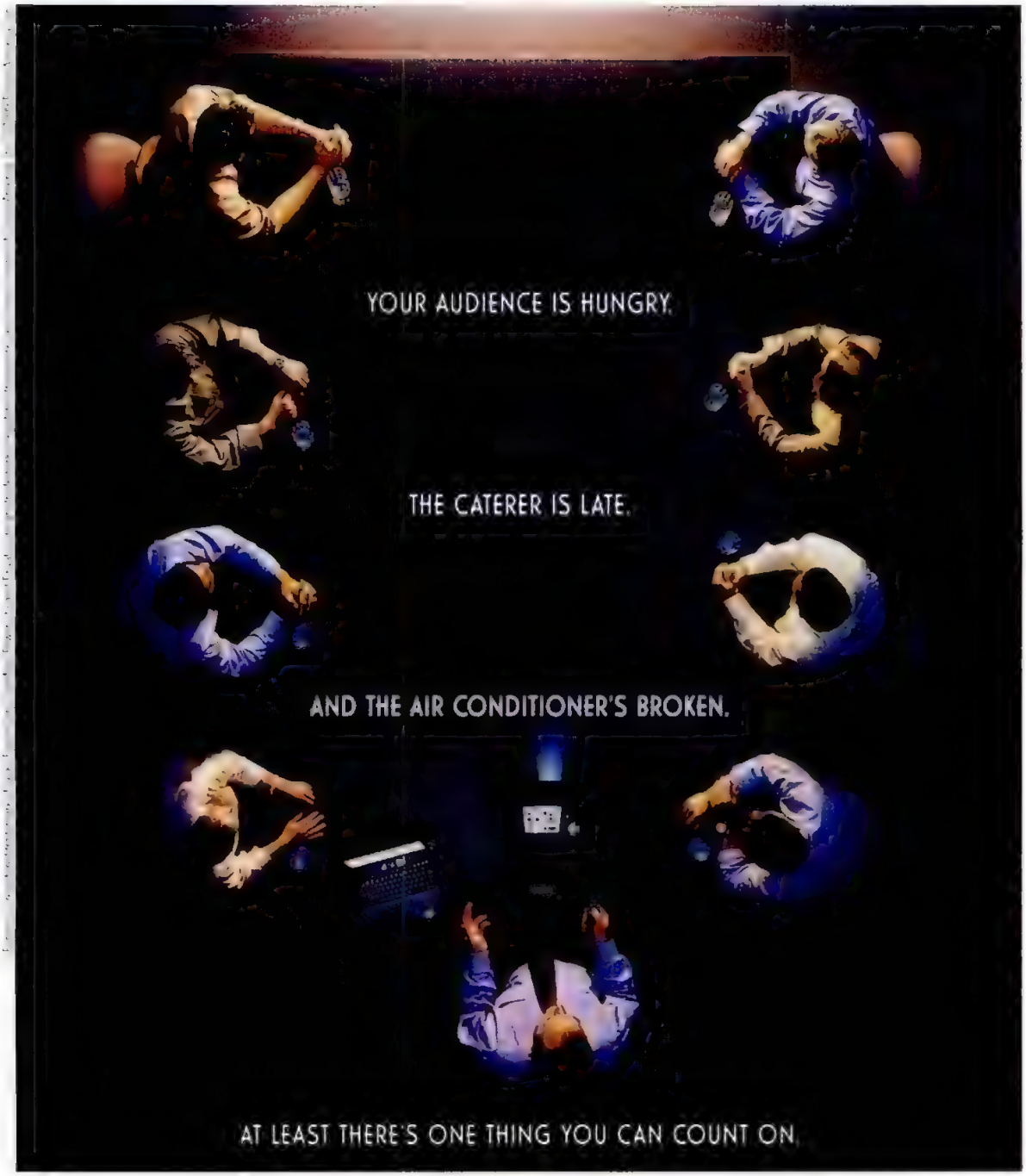
Share Media is a visual graphics database that includes well-organized clip art and an easy-to-use import wizard that creates links to files on your network. Share Viewer lets users on the network view documents in over 30 formats. In addition, your associates can mark up documents.

Most of iGrafx Designer 2000 Suite's innovations are cases of catch-up with the competition. Still, it supports logical and creative workflow and would be useful for technical or business illustration. But for image editing, you'll do well to wait for the release of Image 2.0 this winter.

iGrafx Designer 2000 Suite. List price: $399; upgrade, $299. Requires: 16MB RAM for Microsoft Windows 95 or 98, 24MB RAM for NT 4.0 with Service Pack 3; 130MB hard disk space. Micrografx Inc., Richardson, TX; 800-664-6957; *www.micrografx.com.*

PHOTOGRAPHY BY THOM O'CONNOR

YOU'VE GOT TO SEE IT IN EPSON COLOR.



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Rear-View Presentations

The Sony KL-X9200U projector combines the best qualities of LCD projectors and CRTs.

By Alfred Poor

LCD projectors are a great way to make presentations—but you have to have your projector in the middle of the room, and you need a screen. Very large CRTs are self-contained, but they present problems of weight and image quality, especially at high resolutions. Now you can choose the best of both worlds with the new Sony KL-X9200U LCD Rear Projection Display ($10,000 street).

The KL-X9200U offers a self-contained display solution that handles everything from video to computer signals. The system is as easy to use as a computer monitor—no focusing or adjusting required—and the range of inputs and outputs make this display versatile as well.

The projector has a 50-inch diagonal display with the same 4:3 aspect ratio as a standard computer monitor. The LCD engine has a native resolution of 1,024-by-768 (XGA), but it can scale higher- or lower-resolution images from 640-by-480 (VGA) to 1,280-by-1,024 (SXGA). All this happens in a box that is only 24 inches deep and weighs just over 100 pounds.

How is this possible? The KL-X9200U is a rear-projection display, using an engine similar to a portable LCD projector and a series of mirrors to fold the light beam and project it on the back of a large, translucent screen. Whereas a CRT of similar size would require large amounts of glass, this display is mostly air.

The image is created with a trio of 1.3-inch polysilicon LCD panels. The High Intensity Discharge (HID) lamp is rated for 6,000 hours of use and draws only 100 watts. The display has a full range of RGB and video inputs and outputs, along with full stereo-sound support. The stereo includes a subwoofer, as well as built-in simulated surround sound.

We tested the KL-X9200U using images generated by DisplayMate. The picture was centered and sized correctly, though we had to adjust the phase controls to reduce pixel jitter. We observed no pixel defects, good color tracking, and capable control over gray shades at the light end of the spectrum. The display was weak on dark shades of gray, but this is a small flaw. Convergence was excellent, except for a slight misalignment between red and blue in the lower corner of the image.

The most noticeable problem was the lack of uniformity in image brightness. Depending on our viewing position, the image was considerably brighter in the center of the screen and dimmer toward the corners. Scaling up lower resolutions worked well, but we noticed some artifacts in scaling down from SXGA.

As a large display with many of the best features of both a CRT and an LCD projector in a relatively small, lightweight package, the Sony KL-X9200U LCD Rear Projection Display is worth looking into, both figuratively and literally.

▲ **THE BIG SCREEN:** *The Sony KL-X9200U LCD Rear Projection Display is just 24 inches deep.*

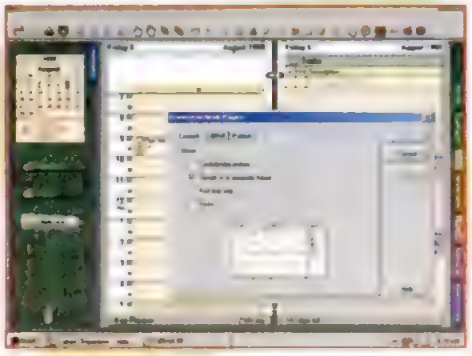
Sony KL-X9200U LCD Rear Projection Display. Street price: $10,000. Sony Electronics, San Jose, CA; 800-352-7669; *www.sony.com/kldisplays.*

A Web-Friendly PIM

Lotus Organizer 6.0 embraces the Internet in a free-for-the-download beta version.

By Edward Mendelson

After years of being slightly aloof, Lotus Organizer has finally woven itself into the Web. We tested a free beta version of Lotus Organizer 6.0 (pricing for the shipping version will be $59 list after a $20 rebate). Version 6.0 looks and feels almost identical to Version 5.0, but slotted into almost every dialog are ingenious Web-related enhancements.



▲ **WEB-READY:** *Lotus Organizer 6.0 publishes calendars or contact lists to a Web site*

The new version maintains Organizer's status as the best-designed PIM, with none of the distracting interface overload in Microsoft Outlook. Organizer 6.0 retains the familiar ring-notebook interface. You can publish a calendar or contact list to an intranet or Internet page, and you have the option to either hide or include confidential appointments or contacts.

You can also make a Web page appear on a notepad page and view the current content of the remote page by opening the Organizer notepad. When you click on the new Street Map or Driving Directions items, Organizer 6.0 opens your Web browser and displays maps fetched from MapQuest.com.

The new WebCard section is Organizer 6.0's catchall for storing information from Web sites. Each WebCard represents a remote Web address, complete with login information for password-protected sites. Organizer 6.0's EasyClip utility can automatically create a WebCard from the page currently open in the browser. As in previous versions, EasyClip can also create tasks, appointments, and contacts when you right-click on its icon.

Organizer supports all versions of the iCalendar and vCard standards for exchanging appointments and contact information over the Web. And Find Person via Internet searches names and addresses in Four11, InfoSpace, and WhoWhere and lets you create a contact entry for any located name with a single click.

This beta version (a 25MB download) is predictable unstable; you may want to wait for the shipping version, which will probably arrive in October. Existing users will be delighted, and those frustrated by overcomplicated or underpowered rival packages may be tempted to switch.

Lotus Organizer 6.0, beta version. Price: Free download. Requires: 8MB RAM for Microsoft Windows 95, 16MB for Windows 98 or NT 4.0; 20MB hard disk space. Lotus Development Corp., Cambridge, MA; 800-343-5414; *www.lotus.com/organizer.*

PHOTOGRAPHY BY THOM O'CONNOR

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Portable E-Mail

The Landel MailBug delivers single-account Internet e-mail messaging without a PC.

By Bruce and Marge Brown

You might expect using the Landel MailBug ($170 street, plus $100 annual service fee), from Landel Telecom, to be child's play. But compared with its closest competitor, the Cidco MailStation (First Looks, September 1), the MailBug is really better suited to more technical users who want a stationary e-mail appliance.

You can use the MailBug to send and receive e-mail with limited text attachments of up to 16K each with any Internet e-mail service; to store messages and addresses; to integrate with Caller ID, automatically dialing the phone; and to monitor multiple POP3 e-mail accounts. The MailBug package includes a 2.6- by 10.6- by 7-inch beige terminal (HWD), an AC adapter, and a 9-volt battery to aid shutdown in the event of a power failure. The unit requires a power connection, so it's not for mobile use.

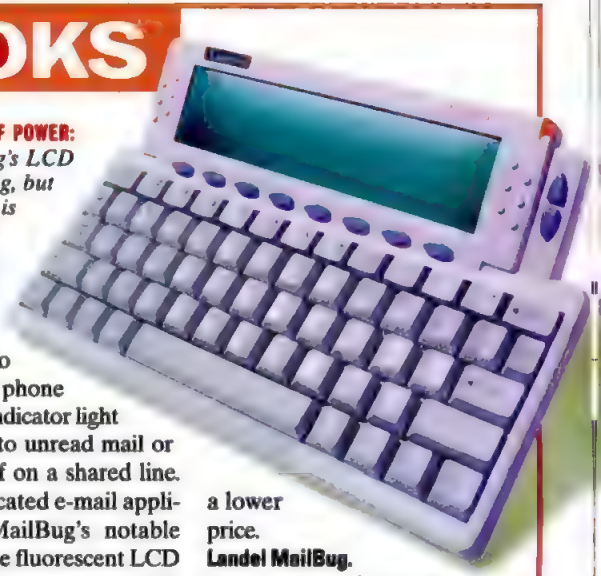
The MailBug's brightly lit, fluorescent LCD (6.9 inches wide by 1.6 inches high) automatically powers off after 1.5 minutes of inactivity and lights up again with the touch of any key. The system's trade-off in displaying six 79-character lines is a modestly viewable, fixed-size, 12-pitch blue character set.

The MailBug application walks you through registration of your e-mail account. If you don't want the annual service contract, you can sign up for one-, three-, or six-month options at slightly higher per-month rates. You can set up a privacy password and store up to 100 (each) telephone numbers, e-mail addresses, and messages in the MailBug's 128K flash memory. All U.S. and Canadian users receive toll-free system access.

We found the MailBug's user interface overcomplicated, with too many hardware function keys. There are eight small keys beneath the LCD, six smaller keys on each side of the LCD, keyboard control and arrow keys, and two scroll buttons on the upper right side of the terminal. The notebook-size keyboard, with 19-mm key spacing, is quite comfortable to use.

The MailBug polls for incoming messages three times a day by default but will increase its polling frequency to hourly with heavy use. All incoming and outgoing messages are listed in one menu, and if you have Caller ID, it lists up to 97 received phone calls. A red indicator light alerts users to unread mail or line-in-use, if on a shared line.

As a dedicated e-mail appliance, the MailBug's notable features—the fluorescent LCD and the ability to process 16K messages with attachments—are not enough to give it an edge over the Cidco MailStation, which includes more options for a lower price.



▶ **DISPLAY OF POWER:** *The MailBug's LCD is outstanding, but the interface is complicated.*

Landel MailBug. Street price: $170, plus $100 per year or $9.95 per month service fee. Landel Telecom Inc., San Jose, CA; 800-831-2169; *www.landel.com*.

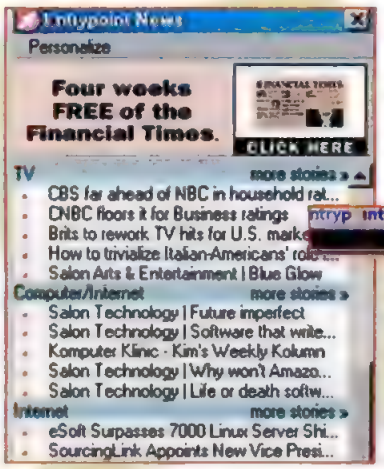
Browserless News—Free

EntryPoint delivers the best of PointCast—plus info for shoppers—in a lighter-weight Internet assistant.

By Don Willmott

So whatever happened to PointCast? Way back in 1997, push technology enjoyed a few months of hype as "the technology that will kill off browsers," but the buzz didn't last. Now it's making a comeback in a new guise.

EntryPoint, a free service currently available in prerelease, delivers the best of PointCast (customizable news feeds that can appear on your screen even when your browser is turned off) without the overhead that doomed the earlier version. In addition, the tool has an entire Web shopping mall hiding behind a button and builds in EntryPoint's eWallet technology, which automatically fills out order forms at online stores. Obviously, a main purpose of EntryPoint is to remind you to shop early and often.



▲ **POINT TAKEN:** *EntryPoint's wide, shallow bar displays a news ticker, stock quotes, weather, and buttons for various shopping and Web links.*

On screen, the EntryPoint bar reaches from edge to edge and is less than an inch high. Fortunately, it doesn't contain ads. You can place the bar anywhere on screen or minimize it easily. While a news ticker scrolls by (you can pause it if you find this annoying), weather reports, sports scores, and stock quotes are just a mouse click away. Other buttons take you to Web resources and travel links, and a window lets you query any of five search engines.

As was the case with PointCast, you can set news and personal preferences in EntryPoint. On your first click, news headlines pop up in a floating window. Mouse over a headline, and a one-sentence summary pops up. Click again, and your browser opens to show you the complete story. This is a smart, low-impact approach (it requires 250K of memory to run) for people who don't want to keep their browsers and Web connections up and running all day.

EntryPoint expects a full launch soon (probably by the time you read this), when it will add other online favorites such as auctions and more industry-specific news categories (the kinds of resources that made PointCast popular for that one brief shining moment). In the meantime, EntryPoint is worth a look for any news junkie (or shopoholic).

EntryPoint. Price: Free. EntryPoint, San Diego; *www.entrypoint.com*.

PHOTOGRAPHY BY THOM O'CONNOR

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Acts like an SLR.
Must be one heck
of a digital camera.

Image shot with Fujifilm MX-2900 Zoom Digital Camera

FIRST LOOKS

The Sound of the Future

The Yamaha RP-U100 personal receiver brings high-quality audio to the PC.

By Bill Machrone

Most converged products to date, such as home theater, home control, and PC telephony, have been more expensive and more difficult to operate than single-purpose devices. Into these rocky shoals sails the Yamaha RP-U100 personal receiver. The unit is a 30-watt-per-channel, two-channel receiver with sophisticated DSP, storage for up to 208 digitally tuned stations, and analog and digital inputs—but only analog outputs, except for recording to Minidiscs.

The RP-U100 accepts digital input from conventional audio sources, from your PC, or via the USB connection to your PC. It also includes an output for a powered subwoofer, which you can balance from the receiver. The receiver sits vertically on your desk and tilts back at the same angle as your monitor.

As an audio device, the RP-U100 is spectacular. With DSP off, it has the transparency you'd associate with high-end audio gear. We switched it into the left and right speakers of a home theater (with a 570-watt advantage over the receiver) and were very pleased with what we heard. Somewhere north of 110 dB, some distortion became evident. But you wouldn't normally

▲ **SOUND CHOICE:** *The Yamaha RP-U100 is the perfect audio accompaniment to your PC.*

when doing high-volume tests.

The RP-U100's DSP provides the usual faux sound fields: a church, a large hall, a theater, and a jazz club, along with Dolby Digital surround sound and a mode for PC gaming. We liked the jazz club effect on small ensemble and solo material but found the church and hall effects to be muddy and unlistenable. You can, however, easily customize a dozen or more DSP parameters.

The movie and Dolby Digital surround effects were fine when playing a DVD through the RP-U100, but you have to be close to the speakers and centered for best effect.

The RP-U100 is a killer headphone amplifier. Again, the unmodified, live, and jazz settings sounded best to us, but this unit deserves the best headphones you can afford.

Yamaha's driver steers the computer's digital sounds out through the USB port. CD, MIDI, MP3, and WAV files all sound great. Controlling the volume from the PC causes minor raspy interruptions in the music, but this is common with LIST speakers too

▶ **WYSIWYG NC:** *The network really is the computer with the Acute ThinCast 8525.*

All-in-One Thin Client

The Acute ThinCast 8525 tucks a network PC inside an LCD.

By Steve Rigney

The cost of deploying a network-based PC adds up to a lot more than just the price of the computer. Installing and configuring the hardware and software can take hours—just one more reason administrators and accountants like to stretch the life of a PC as long as possible. Administrators who wish deploying a client PC were as easy as setting a monitor on a desktop and hitting the power switch may want to consider the Acute ThinCast 8525 ($1,599 list), from Acute Network Technologies.

The ThinCast 8525's 15-inch flat-panel display includes a 233-MHz CPU, the Windows CE OS, a 10/100-Mbps Ethernet adapter, and all the software you need to connect to a Windows NT server running either Windows Terminal Service Edition, Citrix WinFrame, or Citrix MetaFrame. Although the idea of a thin client is not new, the unique concept of placing all of the hardware inside a flat-panel display makes installation a breeze.

The ThinCast 8525 has connections for a standard keyboard and mouse, as well as for a serial and a parallel port. The unit also includes two USB ports for connecting scanners and other devices. The ThinCast 8525 offers optional features as well, such as smart card readers for authentication, touch-screen panels, and a PCMCIA slot. The device supports either Microsoft Windows CE or Linux.

Installation was fast and simple; we needed less than 5 minutes to complete the entire installation, and we didn't even have to read the manual. After connecting the keyboard, mouse, and network cable, you're presented with a connection menu. You then choose between a terminal services Remote Desktop Protocol (RDP) connection (for Windows Terminal Service Edition) and a Citrix Independent Computing Architecture (ICA) connection (for Citrix WinFrame or MetaFrame).

After you select the connection type, you simply type in the name or IP address of the server and any user name or password. Once connected, you can access any application on a server to which you have rights.

Like all thin-client devices, the ThinCast 8525 is designed to connect to a terminal server and run remote applications and access data stored on the server. Because the applications stay on the server, a thin client doesn't need a hard disk and can connect across a relatively slow link.

The main reason to use a terminal server is to let older PCs and thin clients run high-end applications they normally could not handle. By placing all the hardware you need in the monitor and preinstalling the terminal client software, the Acute ThinCast 8525 takes resourceful advantage of terminal servers. **Acute ThinCast 8525.** List price: $1,599. Acute Network Technologies, San Jose, CA; 408-456-0900; *www.acutetech.com.*

PHOTOGRAPHY BY MARK WEMPLE

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Still an Iffy Upgrade

By Edward Mendelson

Microsoft ballyhooed Office 2000 as a major upgrade to its Office 97 application suite, but most of the suite's enhancements are worth having only if you create and exchange documents via the Web (see our story "Microsoft Office 2000: Should You Upgrade?", May 25). Microsoft Excel, PowerPoint, and Word perform their traditional functions with few changes, and some of the new features are confusing: menus, for example, that hide some features and rearrange other features as you use them.

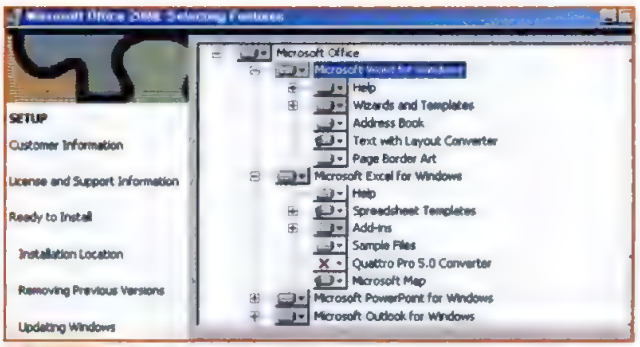
Fortunately, only Microsoft Access uses a new file format, and it now supports all modern alphabets. The most visible changes affect Microsoft FrontPage, which now integrates page editing and site management, and is better linked to the rest of the suite.

Microsoft also took a few steps backward, though. When you open two or more documents within Excel or Word, each document appears in a separate window, because Microsoft found that beginners were confused by multiple documents in the same window. You can restore Excel to single-window mode, but you can't make Word use only one window.

Confusingly, FrontPage still opens multiple documents in a single window, and only users familiar with FrontPage will know how to switch between documents. Microsoft also managed to breed a few new bugs, such as the one that sometimes causes Word to shut down when you cut text from a file.

The two features praised by most readers were the FrontPage enhancements and the new installer, which lets you select components to run from the CD or install automatically when needed. Many complained of the huge disk requirements of the Premium edition (up to 800MB of hard disk space).

PC Magazine and our readers generally agree that Microsoft Office 2000 is worth the upgrade if you need its Internet features, have the hard disk space, and can live with a few bugs. But you may want to take one reader's advice and wait for the inevitable release of a service pack.



YOU CHOOSE: *Microsoft Office 2000's highly praised installer lets you select which components to install.*

MP3 for the Rest of Us

By Don Willmott

With more than one million downloads in its first ten days, RealNetworks' RealJukebox has become something of an industry standard for MP3 file encoding and playback since its splashy debut on May 3. Our First Looks review ("The Real Music Thing," June 22) praised the prerelease version of the software for its incredible ease of use.

Of course, with so many users pounding on the software, we were bound to start hearing complaints. The first wave came from audiophiles, who criticized RealJukebox for not offering an option to rip MP3 files at a near-CD-quality 128-Kbps data rate (it maxes out at 96 Kbps). Competitors such as MusicMatch have this feature.

Also, many readers sounded off in support of WinAmp as a lower-impact and more "fun" MP3 player, citing its customizable interface. Like MusicMatch, WinAmp lets you apply wild and crazy "skins" to create a personal look for the software.

Since our review in June, RealNetworks has rolled out two new beta versions: RealJukebox Beta 2 (free) and RealJukebox Plus ($29.99 download). Both versions let you apply skins to the program's interface—there are 50 to choose from on RealNetworks' site—or create your own. More important, both are compatible with more music formats and portable players. And the Plus version lets you encode MP3 files at CD quality (up to 320 Kbps). RealJukebox Plus also adds a 10-band graphic equalizer, file conversion, and more powerful management tools.

TINY TUNES: *The RealJukebox interface takes up very little space on your desktop.*

A more serious concern is with RealJukebox's insatiable hunger for system resources. For one user, RealJukebox violated the most important rule of MP3: An MP3 player has to let him play music all day while he works on many other apps.

Nevertheless, many of the people who criticized RealJukebox typically use three or four different MP3 utilities for encoding, storing, and playing files. This helps prove an important point we made in our review: Despite its hunger for resources, RealJukebox is an extremely convenient one-stop solution for everything most people will want to do with MP3 files.

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Tell us what you think... How do you like the new products you're using? Second Looks is your forum for feedback. Join us online to tell us about your experiences. We discuss a different new product each week and summarize your comments here. Following are some of your comments from our discussion of Microsoft Office 2000.

Office 2000 is worth the money. *I upgraded to the Premium version, and having all of those programs for one price is great. Now I don't have to use so many different interfaces for photos, drawing, e-mail, and so on. But be prepared to use up a lot of disk space.*

—Nelson Ward

I installed everything from the Premium package *and ended up removing most of it except Word, Excel, and PowerPoint. When I try to use the customizable WYSIWYG features of the template/wizard-driven products, they change my work back to some predefined template style at random intervals. I will always use Word and Excel and sometimes PowerPoint, but give me Adobe and Macromedia products for publishing, imaging, and Web design.*

—Rick Jackanich

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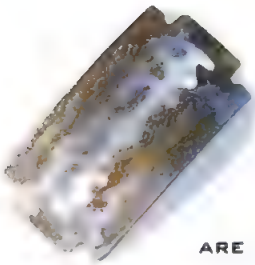

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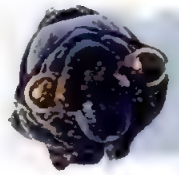

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Reinventing the Music Biz

The record industry is about status quo. The Big Five publishers (BMG, EMI, Sony, Universal/Polygram, and Warner) maintain absurdly high, cartel-like prices on CDs, despite plummeting costs in the technology. The industry destroyed the once-promising DAT format, because it could make perfect copies of CDs, and inveigled Congress into taxing the tapes and recorders into virtual oblivion. More recently, the industry, represented by RIAA (the Recording Industry Association of America), unsuccessfully sued Diamond Multimedia in an effort to block the sale of the Diamond Rio, an MP3 player.

The RIAA's latest attempt to maintain its power is SDMI, the Secure Digital Music Initiative. The goal of SDMI is to allow the sale of music online but to limit the ability to make copies. Soon, all CDs will be encoded with SDMI locks, so that it will become (theoretically) impossible to make unlimited digital copies. SDMI also includes digital watermarking, so that it will be possible to trace pirated material.

But the digital genie is out of the bottle and is not going back. Hackers freely discuss ways around SDMI limitations, especially in making MP3-encoded material available on the Web. Their schemes range from the grand (cracking SDMI encryption) to the mundane (digitizing high-quality analog copies of files, thereby circumventing all the digital locks on the doors and stepping through the open window).

The Big Five, meanwhile, are hedging their bets. Seemingly independent labels are experimenting with direct sales of MP3 songs. Groups such as They Might Be Giants are selling an entire CD's worth of music in MP3 format for $8.99. Individual cuts cost $0.99. Sites such as mp3.com, emusic.com, and liquidaudio.com are putting deals together with popular artists as well as unsigned and independent artists.

Beneath all the positioning are a deep-seated dissatisfaction with the way the recording industry has manipulated artists to maintain control and a constant flow of profits into its coffers. The industry slaps a "new technology" tax on artists' earnings, which was once supposed to underwrite the cost of the transition from vinyl to CDs. Now the tax is a lobbying war chest, making sure the industry keeps getting its way. I won't even begin to address the sins against artists committed by the A&R suits, with their ironclad contracts and phalanxes of lawyers. New groups starve, a few groups at the height of their popularity do extremely well, and artists whose glory is fading are all but pushed from the nest. For a description of how label contracts work, read industry veteran Steve Albini's account at *www.arancidamoeba.com/mrr/problemwithmusic.html*. (Warning: You'll encounter some very strong language.)

Recording industry executives counter that the cost of the medium is the least part of the equation, that producing an album is an investment much like venture capital. They cite development costs, production professionals, consultants, and promotion. It's true that some producers have a knack for extracting the best from any band or creating musical "hooks" that are part of the zeitgeist; they know what's hip, now, happening, catchy, clean, funky, alternative. More likely though, they produce what the label exec wants.

I also download tracks from mp3.com that amaze me. Without the muscle of a major studio, without the investment of hundreds of thousands of dollars in proven producers, without top-of-the-line equipment, aspiring, unheard-of groups manage to put together some great cuts. And when I like a group, I can typically buy its CDs for about half of what they cost in the stores, and the group gets half the profit. Some groups have a new, genuine sound. Would a producer with his own aesthetic preserve it?

As musicians begin to realize that they can successfully promote themselves directly to their audiences, the very nature of the music business will change. Now that anybody can have a digital studio for $3,000 and can print a CD for well under a dollar, all you need is the talent and the desire. Airplay? It matters to some audiences, but kids tend to listen to the styles they already like, and the styles are ever more narrowly defined. Rock has splintered into roots, classic, AAA, country, metal, funk, R&B, punk, and others. Within punk music, my daughter cites ska, traditional punk, skunk, hardcore, and more. Radio stations can't keep up. Neither can the record companies. But the Internet can. It's time for the music business to reinvent itself. PC

PHOTOGRAPHY BY JAY REED

Now that anybody can have a digital studio and can print a CD, all you need is the talent and desire.

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The Linux Myth

Everyone likes a good fight, especially if it's won by a beloved underdog taking on an impossible task. Thus has emerged dear Linux, the "little OS that could." More folklore surrounds this OS than just about anything I've ever witnessed in this industry. But what is Linux's real potential? Unlike most observers, I see no evidence that Linux can take on the big server chores. Its real potential may lie in the cheapest low-end desktops.

Where Linux shines today is in medium-strain server systems. It's a near-perfect solution for the Web site on a budget. It's close to free, and when combined with the famed Apache server software, Linux can handle almost any medium-size page service chore. This is probably adequate for most uses today, but ask the true networking superstars about Linux on big systems under big loads and they all shake their heads.

Ask Linux advocates exactly why no IRC (Internet Relay Chat) server runs Linux. One of my networking gurus said that he has never seen any Linux system on the IRC—probably the roughest networking environment on earth—hold up to the strain. In this instance, we're talking about the three major IRC networks: DALNet, Efnet, and Undernet. With tens of thousands of users logging on at once with numerous clients and multiple connections and with constant attacks from sources around the world trying to shut down the service, Linux can't cut it—period. Why is this never mentioned by the Linux proponents who flood the critics with e-mail anytime anyone says anything to disparage the OS?

Just hating Microsoft is not a good enough reason to promote Linux above everything else. When Linux fails in various subsegments of the marketplace, people always assume the problem is its open-source nature. "You can't get support." In fact, many companies support Linux in the same way Sun supports Solaris. Linux often fails, simply because it isn't robust enough. Contractors know this but fear the wrath of the Linux community and blame support. It's a phony excuse. This BS factor is what bothers me. The inadequate-support explanation creeps in for no other reason than to keep the lunatic fringe of the Linux movement from clogging the e-mail system with complaints. The fact is, Linux has yet to prove itself at the top of the food chain, and until it can run eBay, for example, it will remain the "in-between" OS.

The low end is where Linux should gravitate. By this I don't mean Pentiums running in offices. I mean on AMD chips in sub-$200 computers with small amounts of memory and $50 hard disks. Under a normal load Linux is quite remarkable. It's small, fast, and stable. It's quite amazing actually. But it's still Unix and used primarily as a command line OS. There are numerous GUI shells for the thing, and there's no reason the Linux community can't standardize one and stick with it (except that there seems to be a rule against even imagining such a concept as *agreement*).

Many like to blame Microsoft's dominance for the death of competition and innovation, but more likely, business simply pooped out. Computers can be used to automate only so many things. Once word processors, database managers, and spreadsheets were invented and perfected, what else was there? Just games. The modem-equipped machine was good for remote access; then the Web was invented, and now there is nothing left to conquer. For at least a decade, the only thing that's been going on is the debugging of old code. Without the Net, the computer business would have been in the toilet years ago.

Now that you can combine a free OS with any number of cheap Linux-oriented office suites, it's time for a reemergence of VICs (very inexpensive computers). Microworkz has a $199 machine called the iToaster, which uses the kernel of the BeOS (the true competitor to Linux) to keep prices low. This trend will emerge within the next 12 months and will take the world by storm. Intel and the chip makers know this. In case you haven't noticed, their strategies are going toward the low end in a near panic.

On a $199 machine, the OS can't cost more than a few bucks. Microsoft will have to shoot the OS cash cow if it wants to play. Microsoft won't be able to bundle its suites down there either, and it won't give Win CE away. So Microsoft's out of the picture. This new market has Linux written all over it. Get ready.

Linux often fails, simply because it isn't robust enough. Contractors know this but fear the wrath of the Linux community.

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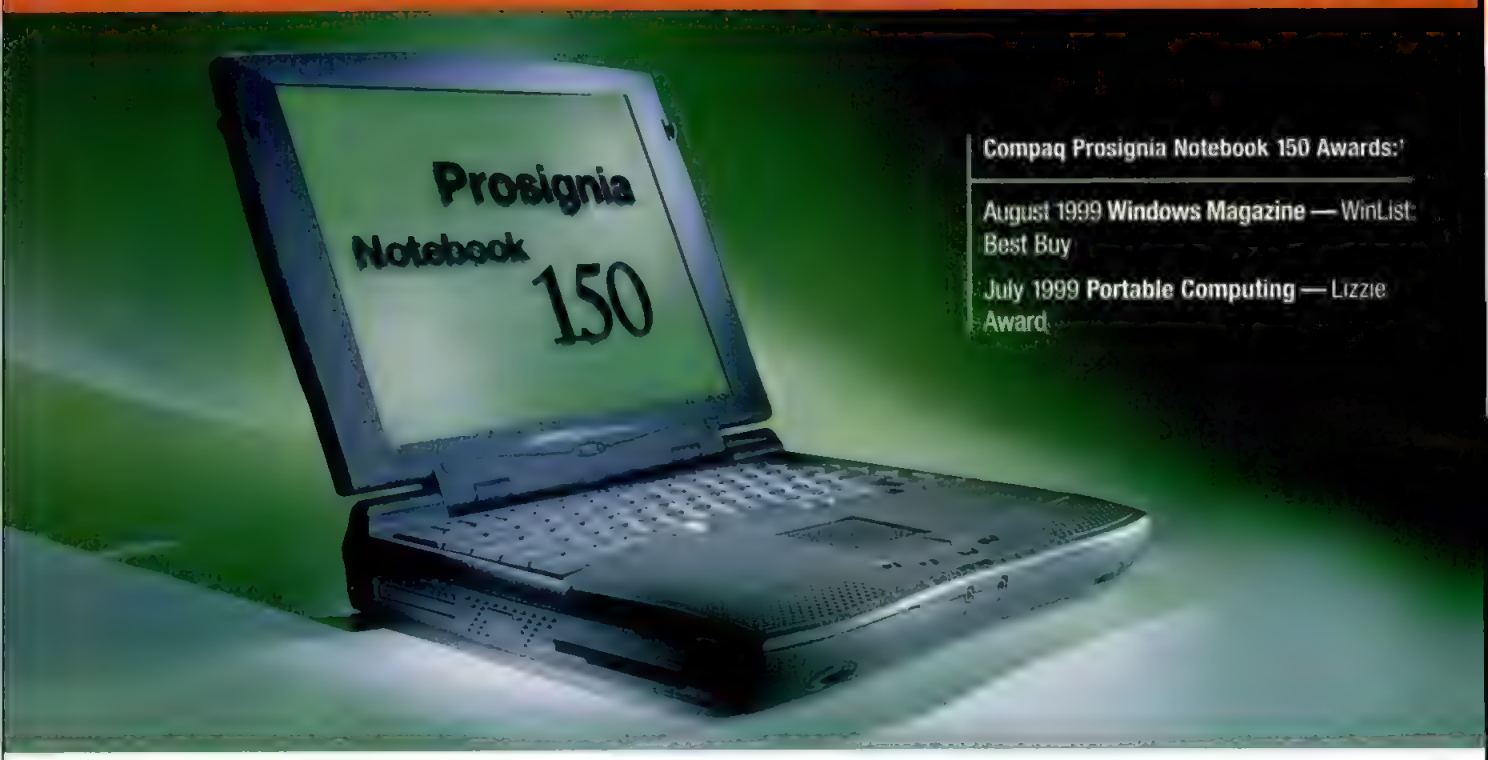

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John C. Dvorak's

INSIDE TRACK

What Goes Around Comes Around—Again and Again Dept.: Many people buying computers today can't remember when memory cost $100 a megabyte or when memory prices fluctuated on a two- to three-year **boom-and-bust** cycle. We were certain that the cycle was over for sure. Everyone is making memory and there are no more shortages, right? Well, apparently the demand for flash memory for cameras and those **MP3 players** is growing so fast that we can expect to see a rise in prices as vendors ramp up to make more flash. DRAM prices are expected to suffer the most. This might not be a bad time to pick up that PC-100 module. You've been warned.

Bombs Away Dept.: In August, Iridium, the low-flying satellite operation, defaulted on some secured debt and has now filed for bankruptcy. I've had doubts about this concept from its inception, but you have to wonder how this **failure** will affect Teledesic—the **grandiose satellite scheme** in which Craig McCaw and Bill Gates are involved. **My prediction: in the dumper.** Not that I'm one to say I told you so.

The Latest ADSL News Dept.: Apparently IBM is going to be one of the many PC makers planning to put **an ADSL circuit on a motherboard.** During the early days of modem use, nobody would ever think of building a modem on the motherboard, except in a few laptops. One could argue that modems were changing speeds too rapidly to deploy on motherboards. But even at 56K nobody was doing it, and I'll be astonished if 56K is surpassed. Now I hear that Compaq, Dell, and IBM are going to put DSL modems on motherboards. Who is promoting this concept? With cable modems neck and neck with DSL, why aren't they putting **DOCSIS modems** on there, too? I find it peculiar.

The headers are gone. Nobody knows where or who you are. All the paranoid freaks out there are using this Web-based e-mail.

Anyone who is fortunate enough to have DSL probably knows that it comes in a **variety** of flavors and tends to be sold as a system, not components. For your money, you get a combination of a connection vendor, an ISP, a specific type of DSL modem, and assigned IP addresses. These items are **not necessarily interchangeable.** They're sold as a package. In some instances you may be able to swap an ISP by going through a hassle (and get new IP addresses in the process), but this is not the same as the old modem game. The situation promises to be similar when the G.Lite standard is implemented, but when and where is this going to happen? So there is **something fishy** about these computer companies making these plans—unless there's a bigger scheme afoot.

Microsoft Munchkins Are Back at It Again Dept.: Will Microsoft ever learn? Some years back Microsoft employees were notorious for anonymously joining online communities, representing themselves as everyday Joes who had good things to say about Microsoft and trash to say about OS/2. Now, according to a *New York Times* article, at least one employee has been caught posing as a civilian and posting an anti-AOL message with a Yahoo! mail account. The deep headers indicated he was actually **inside the Microsoft corporate firewall** when he sent the note. These Microsoft folks apparently don't realize it's harder to hide on the Net than they think. I'd recommend they read a few Net books from O'Reilly Publishing. And at least they could be smart enough to use the **latest poison-pen technology,** like Hushmail.

Hushmail (*www.hushmail.com*) is designed by hackers for total security. The headers are gone. Nobody knows where or who you are. All the paranoid freaks out there are using this Web-based e-mail. Users of the *www.dvorak.org/home.htm* home page have already been introduced to this. Of course, when I see something this good, **I suspect the NSA is actually running it.** All in all, though, Microsoft should probably trash AOL anonymously. Only Clinton would know, and he'd get a kick out of it. Just a thought.

It Never Ends Dept.: The computer-using public is gearing up for Merced—the powerful processor that may result in some new applications that nobody has **thunk up** yet (we hope!). Storage technology looks as if it's going to take another giant leap, with one insider predicting that you'll be able to get a **30GB hard disk next Christmas for less than $100.** Pretty soon, it will be next to impossible to find any hard disks with less than a 10GB capacity—vendors simply won't be making them.

When all this capacity is combined with video compression, the result is that all these RePLay TV–type devices, which use the hard disk to record video, should eventually become trivial. Already one satellite set-top box has the hard disk video technology built in. Such hard disk capacities, combined with ADSL and cable modems, also bring into play a **frightening online scenario** that is now unfolding. Kids who made a hobby of trading MP3 music over the Net are setting up shop with **MPEG-1–coded first-run movies,** which are traded freely.

Austin Powers and *The Phantom Menace* were on the Net before they were in the theaters. Once the movie makers switch to pure digital (as Bill Machrone discussed in his September 1 column "Film's Dead. Are Actors Next?"), the potential for recoding onto MPEG-1 for downloading over the Net becomes extreme. In the past I've criticized the Motion Picture Association (and Jack Valenti in particular) for its Luddite attitude and skittish paranoia toward high technology. This time it has something to be concerned about. Unfortunately, after all those years of hearing it cry wolf, nobody will be listening. More to come. PC

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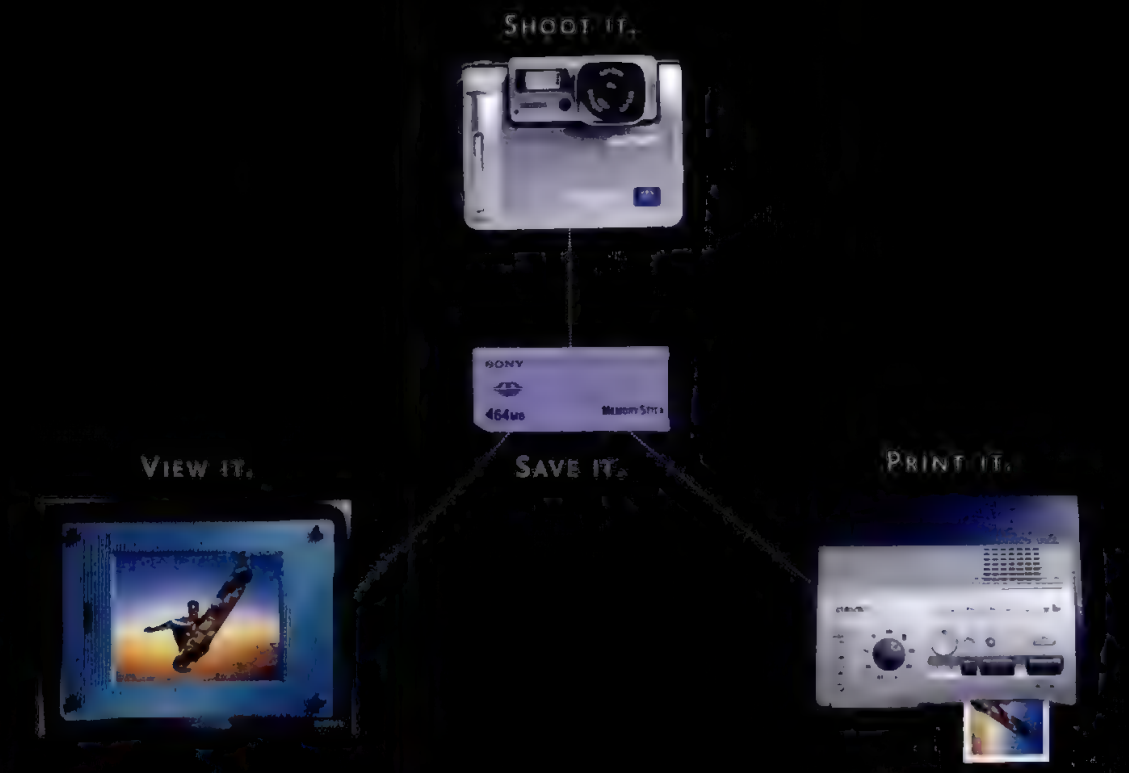

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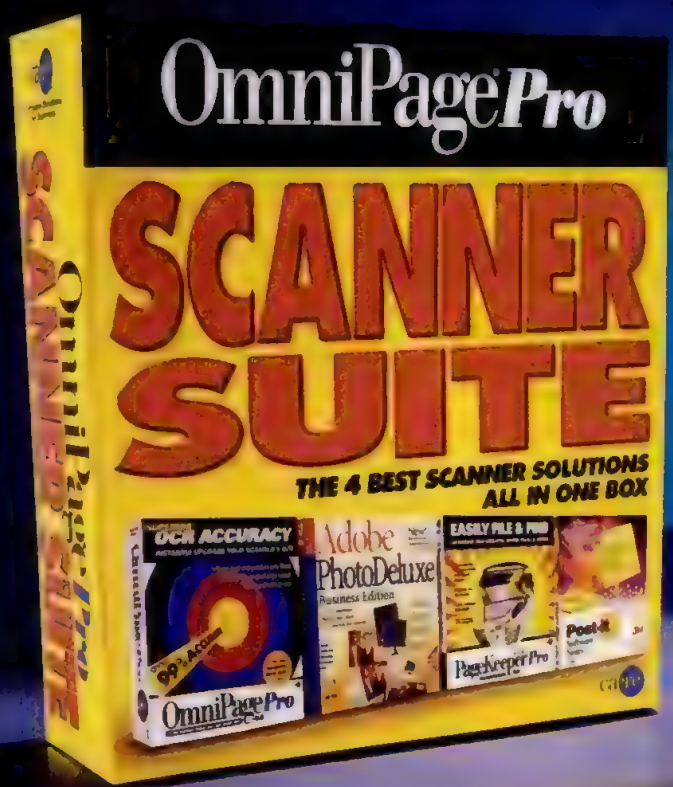

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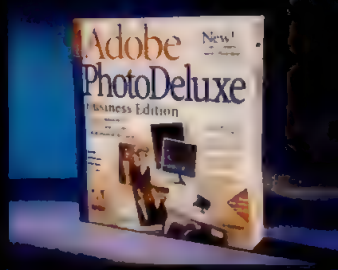

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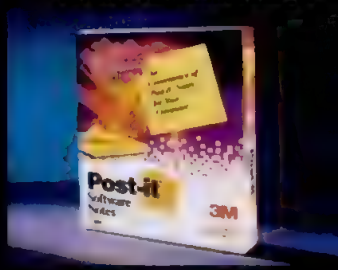

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Jim Seymour

Content or Connection?

Our connection to the Internet is vital for a great majority of PC users, and over the years, for many of us, it has been a sometimes difficult, often frustrating relationship. Busy signals, dropped connections, and other technical glitches in ISPs' back offices have been only part of the problem. Business-side issues such as slow and feeble tech support, inaccurate billing, and frequent changes in billing plans have aggravated us even more.

Through all that, our ISP links have become even more important; the Net occupies a larger portion of our time at our computers and takes on a larger role in our lives. With the explosion of the Internet beyond the boundaries of PCs and into the world of "information appliances," "persistent connections," and devices that haven't traditionally been hooked up to the Net (think of refrigerators with IP addresses), our Internet connections have changed to something approaching a necessity of life. (Think that's an overstatement? Another year and you won't.)

Now your connection to and your relationship with your ISP are about to undergo major changes. One layer of change is obvious: Connection speeds are increasing. Changes in pricing plans for Net access are obvious, too. The third change, however, may be the biggest one, although it is still largely hidden: the conflict between content and connection.

Today, access providers are scurrying to line up content with a capital *C*: information-filled portals (née "start pages"), special features, local news and entertainment schedules, Wall Street news and stock prices, and so on.

I have a problem here—a big problem. I'm convinced that when we buy Net access, we aren't looking at content (the Web itself is literally a *world* of content, far wider, deeper, and more interesting than anything any ISP can layer atop our Net connection), but rather for fast, reliable, transparent connections to the Net.

Yet ISPs, big and small, are spending more time and money on this nebulous content rather than on faster, more reliable infrastructures and tech support.

The problem is aggravated by the poor quality of the content ISPs deliver. But improving that watery, half-baked content isn't going to change the equation. Because if what I'm looking for is a fast, reliable connection, giving me weather maps and animated clowns on-screen isn't going to charm me.

ISPs say they're providing all this ephemeral content as a way to give us more for our money, to add value for their customers. Uh-huh. What they really want is to keep us at their sites longer, before we jump to the Web sites we really want to visit. They want to sell banner ads and various other forms of click-through money-makers on their pages, thus increasing their revenues beyond the monthly fees we pay for connections.

This dichotomy between content and connection is visible everywhere in the market. Take Time-Warner's RoadRunner service, for example—the number-two cable-modem service and, I think, the fast-access provider that does the best all-around job right now. RoadRunner is adding more and more content to its start-up page, including material from local newspapers, Bloomberg, CNN, Epicurious Travel, Fox, and many more content providers. Log on to a RoadRunner account and you get trivial glimpses of content in many areas. If these were rich, tightly edited nuggets of information—an effective summary of what's going on in your world—that might have value. But they almost never meet this test and are, in fact, little more than ads for those services' own direct offerings. Good connections, feeble content.

Don't imagine that ISPs don't get it. They *get* it just fine, but they want greater revenues.

This is nowhere more visible than with America Online, which from the beginning has provided both connection and content. AOL has a broad if often shallow range of content offerings. It makes a bundle from its nearly 20 million subscribers' monthly fees, and it sells "preferred information provider" arrangements to vendors of information, goods, and services for tens of millions of dollars each per year. AOL bombards us with ad messages galore when we sign on, and again and again as we move through its "content."

So what, if anything, is going to change? I think the rush toward free or nearly free Net access (we'll define *free* in a minute) is going to force ISPs to think about what they're selling: content or connection?

The "free ISP" rage started in England last year,

ISPs, big and small, are spending more time and money on nebulous content rather than on faster, more reliable infrastructures and tech support.

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Jim Seymour

when U.K. consumer electronics retailer Dixons Group (*www.dixons-group-plc.co.uk/*) started Freeserve. Brits loved the idea of not paying for Net time, which has always been more expensive in most of Europe than in the U.S. By midsummer of this year, Freeserve had 1.3 million customers, jumping ahead of AOL with about a third of the U.K. market—and had been spun off by Dixons in a fabulously successful IPO, valued at more than 3 billion pounds by investors. (Note that in Europe, customers pay by the minute for their phone connections in addition to Net access charges, and Dixons gets a slice of that per-minute phone-usage charge, so this economic model is not universally applicable.)

The success of Freeserve scared the heck out of traditional ISPs. AOL started its own free version in the U.K.; Dell jumped in with free ISP services for its customers; and the cracks in the old models became evident.

In the U.S., we now have "free" Net access from several sources—but the price, inevitably, is a barrage of ads and monitoring of our online activities, which to my mind means the access isn't really free.

If we move toward adoption of free Net access in the U.S. (I expect to see widespread free-access usage here before the end of 1999), then we're likely to see even more of this info-junk, passed off as content, as a critical revenue source for the free-access providers. AltaVista is jumping into free Net access via this route, and Microsoft is widely expected to offer a free version of MSN, including dial-up access soon. More will follow.

But this pricing pressure could also push some ISPs in the other direction, toward stripping away the ephemera (and its related costs) and selling us just Net access—for very little. Already Qwest, the fiber-optic–network outfit that gobbled up former Bell operating company US West earlier this year (*www.qwest.com*), is selling long-distance service with fast Net access bundled in for free—in packages starting at $24.95 a month.

Consumers may finally have a chance to choose which they really want: a fast pipe to the Internet or a kind of ragged bulletin board that just happens to come with mediocre Net access. PC

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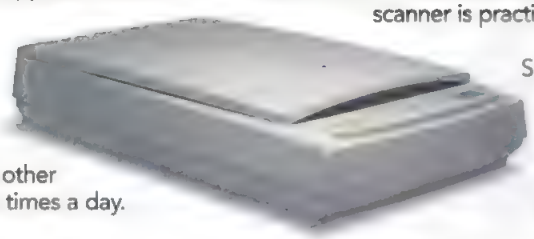

Sure, we have all the specs and features you expect in a quality scanner, but we think you'll be much more impressed with those five friendly buttons up front.

Visioneer OneTouch offers a simpler, more elegant solution. It does most of the work for you, thanks to its tight integration with the PaperPort software.

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Bill Howard

The Bang & Olufsen PC

"You can never be too rich or too thin," the Duchess of Windsor said. If you're going to buy a thin PC, you'll need to be rich, because you'll be paying a healthy premium for small size and stylish design. Still, the market for slim PCs is beginning to take off.

These are the small AC-powered desktop PCs with flat-panel LCDs. Most are integrated into a single piece—monitor and system unit combined—though some use traditional CRTs to keep the cost down. Space-constrained Japan long ago embraced compact PCs; many double as TVs. Five years ago, most of the home PC makers in the U.S. brought out single-piece, CRT-based PCs that sold marginally well in the holiday season and not at all the rest of the year. So they retreated and licked their wounds, leaving us with the choice of large and medium-size cookie-cutter beige boxes.

Now compact PCs are back. Virtually every major manufacturer will have at least one model out by year's end. Not that they ever completely went away: Most major PC makers had ongoing R & D projects for small-and-stylish PCs. So why is this happening at this time? Success for the cute, one-piece Apple iMac gave PC marketing managers the courage to push their projects forward. Components, from motherboards to drives, are getting smaller. USB expansion is finally taking off, letting you expand outside the box. More homes are buying second and third PCs, and the PCs are going in places where compact size is important: the kitchens and bedrooms rather than the home offices. And when the economy is strong, the Bang & Olufsen syndrome emerges: People pay more money to get the same stereo-equipment performance in a nicer package.

On the PC side, we're seeing products both for home and for the office. When you're paying $30 to $60 a square foot annually for office space in a big city, an LCD-based computer lets you contemplate smaller cubicles for your next office redesign, or they can make existing cubes seem bigger.

So far we've seen the Gateway Profile XL, Sony VAIO Slimtop, and NEC Z1. By comparison, the iMac is a home-only product, because it's not very fast or expandable; Apple is not a player in business, except in graphics and design. If you want any kind of performance, expandability, or a decent monitor, you have to step up to the Macintosh G3 tower. There are also two Intel-based iMac look-alikes, the emachines eone and the Future Power E-Power, that have Apple annoyed, because (a) they look very much like the iMac, and (b) they're cheaper.

Of these PCs, I'm most enamored of the NEC product. It recalls the glory days of the 1980s, when NEC was a force to be reckoned with in desktop PCs, notebooks, printers, monitors, and even home entertainment—rather than the 1990s company that bought into Packard Bell on the way down. The Z1 does most everything mostly right: To begin with, it's the best-looking of the lot, and it's not a wimpy low-end system. 10/100 Ethernet is built in, making the Z1 suitable for the office or for home if you're going to a run an Internet cable modem connection or run a home network. The Z1 has four USB ports, not two, and that's important, because USB peripherals are like peanuts: You don't stop with just one. The system has a DVD drive (a curious omission from the first Sony Slimtops), not a CD-ROM drive.

The unit I tested had a 450-MHz Pentium III chip, 96MB of RAM, and an 8.3GB hard disk, all of which are one or two notches south of ideal—but you won't be embarrassed by the PC's performance. You can lift off the 15-inch, 1,024-by-768 LCD panel, and you'll be able to replace it with a 17-inch LCD sometime next year, NEC hints. The NEC Z1 costs about $2,500, which, to me, breaks out to $1,000 for the computer, $1,000 for the integrated flat panel, and $500 for the B&O effect.

If you want slim and chic, you don't have to go the all-in-one route. Combine a 15-inch CRT panel with a small desktop PC system that you stick under the desk and you'll be just about as space-efficient, although you'll be dealing with a few extra cables and beige cases. Or you can go for a notebook computer with a 15-inch display at about the same cost as an all-in-one desktop, and you'll have the added benefit of a built-in two-hour UPS: the laptop battery. PC

When the economy is good, the Bang & Olufsen syndrome emerges: People pay more money to get the same performance in a nicer package.

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www.pcmag.com/opinions

You
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take
breaks,
why

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* SOFRES/InterSearch Windows OS User Reliability Study (6/98). Participants using Windows NT Workstation were about three times less likely to experience serious system stoppages than Windows 95 users surveyed.

† Price is estimated street price. Actual price may vary. Monitor not included.

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The Web You Want

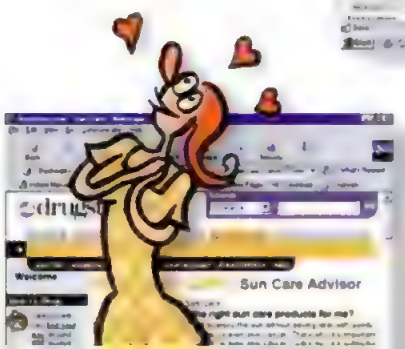
By David Lidsky

Every morning, the same newspaper hits your front door, and you always wind up using the lifestyle section to line your bird cage. Once a week, you stop into your local computer store looking for the latest games, but the sales staff always seems to be different (and indifferent). The fact is, the newspaper and computer store have no way to keep track of your tastes. And even if they did, they don't have the resources to do much with that information. Enter the Web.

The Web is the first medium where your voice is king. You can communicate directly with the creator of the content or the seller of the merchandise—no matter how big or small the organization may be. This opportunity can result in a more meaningful relationship—one in which both you and the business benefit.

Using personalization technology, your favorite newspaper's Web site can deliver a custom edition that covers only the topics you care about to your digital doorstep (your bird's the only loser in that scenario). An online computer store can not only recall that you like computer games, it can even analyze your previous purchases and recommend some new titles you'll probably enjoy.

The Web is a great leveler. You often can't tell the difference between the site of a billion-dollar megalith and that of the proverbial two kids in a garage. Deciding where to turn online for products, services, and



information can be even harder than it is in the real world. In the near future, a key differentiator that will help you decide where to shop and what to do online is how much of a personal touch each site offers.

GETTING BETTER ALL THE TIME

Sites such as Amazon.com and Dell.com have become famous for giving customers exactly what they want. But so far they've barely scratched the surface of what's possible. Now we're getting a tantalizing peek at the Web sites of the future.

Commerce sites have been the quickest to begin adopting new technology, largely because businesses realize that personalized shopping can make the cash register ring. For example, Amazon.com and Beyond.com will offer recommendations based on what other users bought who share your tastes. That's a parlor trick compared with the live sales reps who guide you around a site and help you find and purchase goods or the personalized virtual model at the Lands' End site that shows you how the catalog's clothes will look on you.

Content-based sites such as portals and newspapers already offer simple customization that gives you local information based on your ZIP code and topics that you expressly say you like. But you can expect to see sites adopt more advanced tools that can anticipate what you want in real time as you browse.

No matter how sophisticated sites become, many users still have trouble navigating them and making purchases online. According to NetSmart Research, 83 percent of Web surfers are frustrated with navigation, and Forrester Research estimated earlier this year that two-thirds of all e-shoppers abandon their shopping carts before checkout. New customer-support tools are helping to address these problems. For instance, intelligent agents learn over time how to respond to your inquiries or complaints more quickly and effectively.

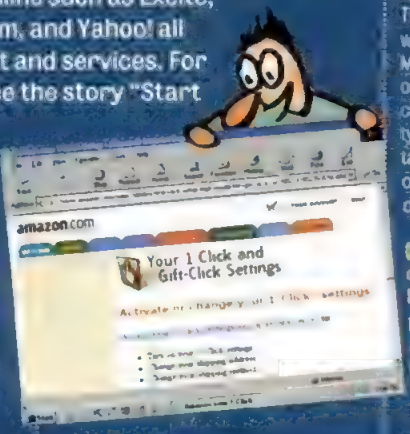
Most of these advanced features are still rare on the Web today. But as our story illustrates, some forward-looking sites are rushing to implement them. Within the next few months, you can expect to see more and more standout applications that make the experience of buying goods, finding information, and receiving customer support on the Web better and easier.

A LITTLE PRIVACY, PLEASE

Right about now, you may be thinking to yourself, "All this personalization stuff *sounds* great, but what happened to the anonymity of the Internet?" The fact is, you've never really been as anonymous on the Internet as you thought. But as Web sites get better at gathering personal information, there is the potential for abuse, and privacy becomes a greater concern.

Sites Getting Personal

The first stop for a personalized Web experience is a portal site. Major destinations online such as Excite, Lycos, NetCenter, Snap.com, and Yahoo! all offer customizable content and services. For more on these services, see the story "Start Here" in this issue.



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Shopping online at Amazon is easier once it gets to know you. The Recommendation Center will steer you to the right books, music, and videos. Once you've made your selections, the 1-Click feature lets you purchase books and other goods and check out with a single click.

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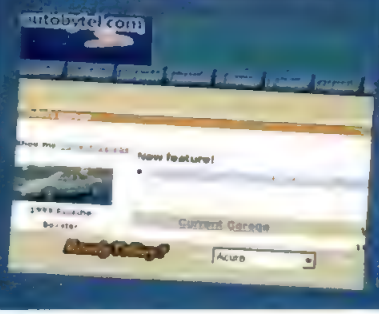

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Think of AutoConnect as a virtual notebook where you keep all the information on your current cars. Once your car information is entered, you can opt to receive recall notices and up-to-date model information via e-mail.

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Fox News
www.foxnews.com
Want to play news producer? Fox News

To get personalized attention, you do have to give up some information about yourself. 1-800-flowers.com can't remind you to buy a bouquet for your spouse if you don't tell the site your anniversary date. Each step of the way, you will have to determine which sites you are willing to trust and what types of information are okay to provide to them.

Because you are entering into a relationship with each Web site that you customize, you should first read the privacy policy. It's also a good idea to look for the logos of independent organizations that certify sites as trustworthy, such as BBBOnLine (*www.bbbonline.com*) and TrustE (*www.truste.com*). Ultimately, the Platform for Privacy Preferences (P3P)—an emerging World Wide Web Consortium standard—should establish protocols that let you control what sites are allowed to know about you.

OFF TO A SLOW START

Privacy issues aside, when you consider the potential of personalization, you'd think that every site out there would offer such services already. But that's not the case. Time and money are the culprits here.

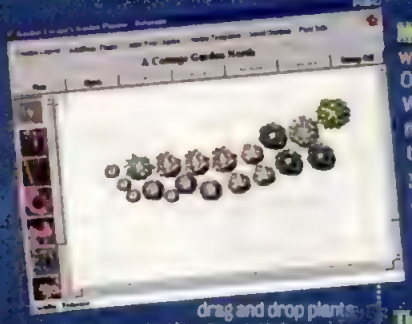
Implementing the kind of personal

Our Contributors: DAVID LIDSKY is a senior associate editor at *PC Magazine*. ANGELA GRAVEN is a staff editor and MAGGIE OVERFELT is an editorial researcher at the magazine. GARY GUNNERSON is an IT architect at Gannett Corp. and a frequent contributor to *PC Magazine*. GREG ALWANG is a contributing editor, and Senior associate editor JOHN MORRIS was in charge of this story.

offers Create Your Own Newscast, which lets browsers select videos of the day's top stories. If that's still too much customization work for you, enter some preferences and let Fox select the stories. Add-on news links to written stories are available, too.

Garden.com
www.garden.com

Before turning over a shovelful of dirt, plant a virtual garden at garden.com. The site's applet lets you plot a garden and



drag and drop plants onto it to see how it will look (from an aerial view). Once you're done, garden.com assembles a price list, and you can order your entire garden in a single step. Enter birthdays and prospective planting days into the Important Date Reminder, and the site will send an e-mail reminder two weeks beforehand.

The Home Depot
www.homedepot.com

Landscape your lawn, with advice from the pros at The Home Depot. After you register, select the home project you're currently working on and highlight your decorating style; this site will spit back some project ideas and tips to make your job easier. It'll also calculate the costs and keep the location of the nearest store at the top of your page at all times.

Lands' End
www.landsend.com

Want to try before you buy? Lands' End has come up with a creative way. Select your face shape, hair style and color, and basic body shape, and Lands' End generates Your Personal Model (for women only). You can even give it a name. Find out the most flattering ways to wear clothes and what types of styles fit your body shape with Your Style, then start your virtual shopping spree by trying out suggested outfits on your model.

Levi.com
stylefinder.levi.com

Click on the Style Finder icon at this Generation-X site and let Levi pick out clothes for you, based on your tastes in music, fashion, and what you like to do for fun. For the best results, be honest about your tastes; checking both the "Surfer" and "Professional" looks yields a clashing button-down Oxford with baggy khakis.

Mercata
www.mercata.com

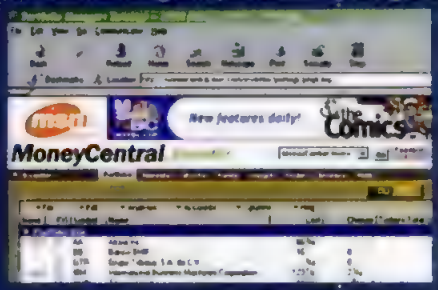
One of the department stores of the Web, Mercata uses its e-mail management system for more than responding to customer complaints. If you can't find your favorite line of kitchen utensils anywhere online, send Mercata a message. If enough customers demand the same item, you just might see it pop up for sale on Mercata.

The MountainZone
www.mountainzone.com

Once you've exhausted yourself by reading the mountain-climbing feature stories and extreme sports news bits that fill the front page of ESPN's The MountainZone, head to MyMountain.com. There you'll find weather-condition reports, stories, and gear reviews related to the sports you're personally interested in—based on your favorite season of the year.

Moviefinder.com
www.moviefinder.com

Got movie suggestions? The zany producers of E! Online do, at their Moviefinder.com site. After filling out a quick inconse-



querying survey, browsers can write short film reviews, post movie messages and grade films. The grades are the database's filter for recommending films. Click on a certain genre or type in the name of a favorite movie and Moviefinder.com will list related titles.

MSN MoneyCentral
moneycentral.msn.com

Easily track your investments with MSN MoneyCentral's Portfolio Manager, a free service from Microsoft. You just need to download an ActiveX application and register with Microsoft Passport before you begin. The Portfolio Manager is very convenient, because you can import your investment data from Quicken, Money, or even your account with your broker; it gives up-to-the minute news, analysis, and alerts on your stocks.

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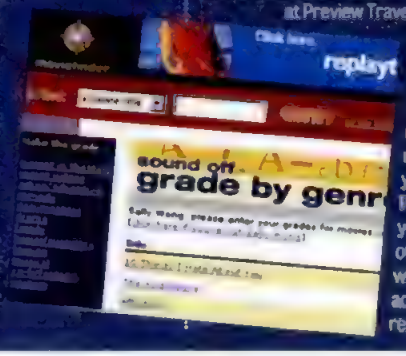
www.previewtravel.com

Ever wish you had access to the fare-saving information that travel agents use? Now you can, after filling out a short form at Preview Travel. You'll be classified as a business or a leisure traveler and can make payments toward your trip online. Pay less with your allocation of ClickMiles, which start to accumulate after registration.



World Wide Angler
www.worldwideangler.com

Make this fishing stop your home page, and get daily updates on your favorite fishing hole. Tips include the favorite spots of other anglers, tackle shops, and regional news. Use the link to the WWA main site for general tips on fly-fishing techniques and to shop for gear online.

Yahoo! Calendar
calendar.yahoo.com

Give Yahoo! a little bit of your personal info and you get all kinds of stuff, including your own calendar, hosted on its Web site. Schedule important meetings, get reminders on important events, send invitations via e-mail, and keep a to-do list with Yahoo! Choose to view your calendar by day, week, month, or year. The My Time Guides section helps you track your favorite holidays or sports events. It also lets you view a friend's or group's calendar with your own.

Companies that sell personalization software and services mentioned in our story include:

Andromedia
www.andromedia.com

Autonomy
www.autonomy.com

Broadvision
www.broadvision.com

eHNC
www.ehnc.com

Kana Communications
www.kana.com

Microsoft (Passport)
www.microsoft.com

Net Perceptions
www.netperceptions.com

Oracle
www.oracle.com

Personify
www.personify.com

Vignette
www.vignette.com

WebTrends
www.webtrends.com

—*Angela Graven and Maggie Overfelt*

experience that makes you feel as if each Web page were tailored explicitly to your interests is expensive, especially for content-based sites that cannot make back the money spent on the technology, because their advertisers aren't yet willing to pay extra for these services. Commerce sites have been quicker to latch onto personalization, because they can see direct benefits: more sales online and customers who keep coming back.

Even for those sites that can justify the expense of implementing personalization features, it can take months or even a year to deploy these complex systems. Many of your favorite sites are startup businesses, running with skeleton crews and desperately scrambling just to get product out the door or to keep the site fresh. During last year's holiday season, even heavyweights were caught off guard: Sites such as Shopping.com and ToysRUs.com simply could not handle the traffic and crashed or failed to fill orders in a timely fashion. Clearly, online businesses should execute the fundamentals—pick, pack, and ship—before implementing more cutting-edge features.

But none of these concerns are holding back business on the Web, where a Gold Rush mentality prevails. Universally, organizations seem to agree that to succeed online they must provide personalized services that you can't get anywhere else. As personalization expands beyond a handful of sites and becomes the norm, it could become harder than ever to decide where to go online. The best sites will be those few that can successfully implement these personalization features and back them up with top-notch customer support. So think of this story as the State of Your Web, 1999. The best is yet to come.

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The Stuff You Want

By Greg Alwang

Imagine this. As you enter a store, a salesperson greets you by name and hands you a list of recently purchased items and a list of those you're considering buying. Meanwhile, the staff has rearranged the shelves to display just your favorite types of items. After making your selections, you leave, because the store has your payment information and will deliver your purchases to your door within days.

For traditional stores, such service would clearly be impractical, but this sort of hand-holding is possible and preferable on the Web. Despite all the talk about e-commerce revolutionizing our world, according to Forrester Research, on 70 percent of sites only 2 percent of the browsers turn into buyers. To improve the odds, online stores know that they have to establish a relationship with you.

Many e-commerce sites record your every move. When you register, the site may ask a couple of personal questions. Often, the site will offer a *mystore.com* feature where you provide more details in exchange for customization and preferred pricing. As you search for items and make purchases, the site uses cutting-edge technology to analyze your actions while you're in the store and presents appropriate products and related information.

This approach offers several advantages to the seller. First, it greatly increases the chances that you'll find something you want to buy. Second, it gives the business an opportunity to sell you related, enticing items (also known as *cross-selling*). Third, it makes you more likely to come back. Finally, it means the store can run more effective promotions by tailoring them to your preferences. For the consumer, the advantage is that you get what you want without ever leaving your chair.

PERSONALIZATION PIONEERS

Today, businesses are adopting a variety of techniques for customizing their online stores. Leading Web sites walk you through the process of selecting a product for what are known as *considered purchases* (such as cars and computers).

Dell's system configurator is a well-known example, but there are many others. Autobytel.com and AutoConnect both offer decision guides that let you sort through the features of cars to narrow your choices to the ones that best meet your needs and wants. Catalog retailer Lands' End offers a virtual model that lets women "try on" clothes.

Levi.com's Style Finder uses Andromedia LikeMinds to create a custom clothing catalog with items that suit your tastes.

One of the first and largest of the e-commerce personalization players, Net Perceptions has a customer list that's a who's who of the e-commerce world with names such as Amazon.com, CDNow, and Ticketmaster Online. Net Perceptions' real-time recommendation technology uses multiple techniques to put the right products, online advertisements, and content in front of you. For instance, Net Perceptions for E-Commerce employs a collaborative filtering process to make real-time recommendations by analyzing the pages you view, the items you've bought, and the personal data you have provided.

CDNow has many personalization features that are built on this technology. With My CDNow you create an account by entering your name, password, and shipping and billing information. Also, you can enter your preferred music genres. My CDNow displays your order history, recommends titles, maintains a list of your favorite artists, and keeps a wish list of CDs you'd like to buy. Best of all, CDNow tracks what you do with its recommendations ("move to wish list," "own it already," and "not for me") and refines its suggestions. The more you use CDNow, the better it will get at selecting music that suits your tastes.

Although the most advanced sites are getting good at making educated guesses, the more personal information you're willing to divulge, the better customized service you'll get. A great example is Levi.com's Style Finder, an applet that is based on Andromedia's LikeMinds Preference Engine and Product Matching Engine, both of which make online recommendations using information consciously provided by you. The applet records your answers to a series of questions on musical styles (from hard rock to easy listening), "looks" (from retro to rave), and activities (surfing the Net versus snow sports). When you're done, Levi.com creates a custom catalog with jeans, shirts, and accessories that fit your style. Customers who use Style Finder look at more products, spend more money, return more often, and

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spend more time at the site, according to Levi.com.

Besides what Levi.com uses, LikeMinds offers Personalization Server 3.0. It adds a Purchase Engine, which analyzes your purchase history, and a Clickstream Engine, which uses your cookies to customize the site—features similar to those found in Net Perceptions for E-Commerce. Other sites using Andromedia's LikeMinds' server technology include Cinemax and Movie Critic.

How can vendors tell whether all this personal attention is translating into increased sales? Web site analysis and reporting tools such as Andromedia's ARIA, Personify Essentials, and WebTrends' new CommerceTrends provide merchants with the data to spot trends and fine-tune marketing strategies to boost their e-businesses. At sites such as Barnes & Noble and Drugstore.com, Personify's tools let the merchants optimize the return on this communication through visitor analysis, which can be applied to online marketing efforts.

Many merchants tout personalization as being fundamental to the success of their e-commerce strategies, and they've incorporated personalization from the ground up. Amazingly, we've just scratched the surface of Web personalization's potential. In the future, you can expect more integrated personalization, where your customer profile is maintained across all sales channels including the Web, catalogs, and brick-and-mortar storefronts. We'll also see improved techniques for managing customer and product categories and offering real-time incentives and promotions. The commerce sites that prevail will effectively understand their customers, provide relevant content without complication, and offer a pleasant shopping experience.

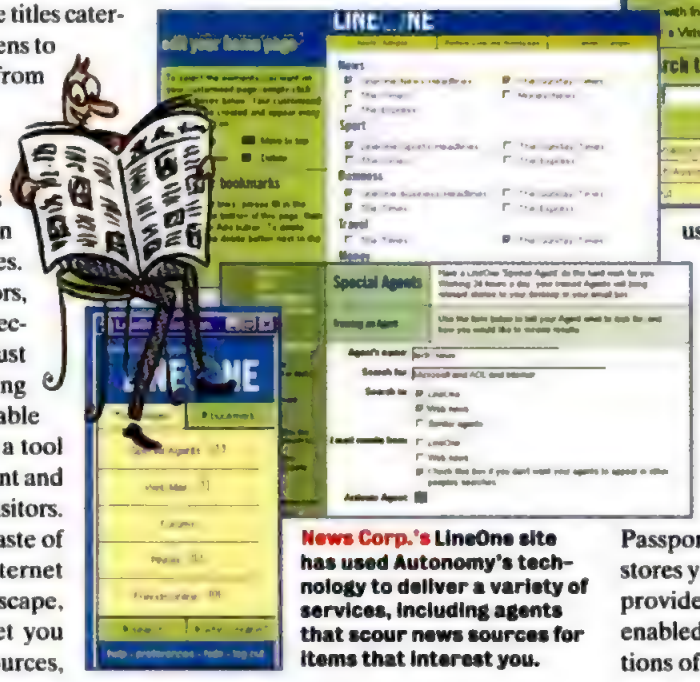
The Info You Need

By Gary Gunnerson

Magazines such as *Life* and the *Saturday Evening Post* used to dominate newsstands. Nowadays, these general-interest magazines have been nudged off shelves by an array of niche titles catering to every audience from teens to seniors, with every interest from the Web to windsurfing.

But no matter how many magazines hit the market, they'll never match the Web's ability to meet the information needs of specific audiences. Publishers—or content creators, in the new-media parlance—recognize that the Web is not just another medium for delivering the same information available elsewhere (*repurposing*) but a tool for offering customized content and services that will entice new visitors.

Most users get their first taste of content customization at Internet portals. My Excite, My Netscape, My Yahoo!, and MSN all let you specify the topics, content sources, services, and links that appear on your start page. (For more on the customization features of Web portals, see the article "Start Here" in this issue.)



News Corp.'s LineOne site has used Autonomy's technology to deliver a variety of services, including agents that scour news sources for items that interest you.

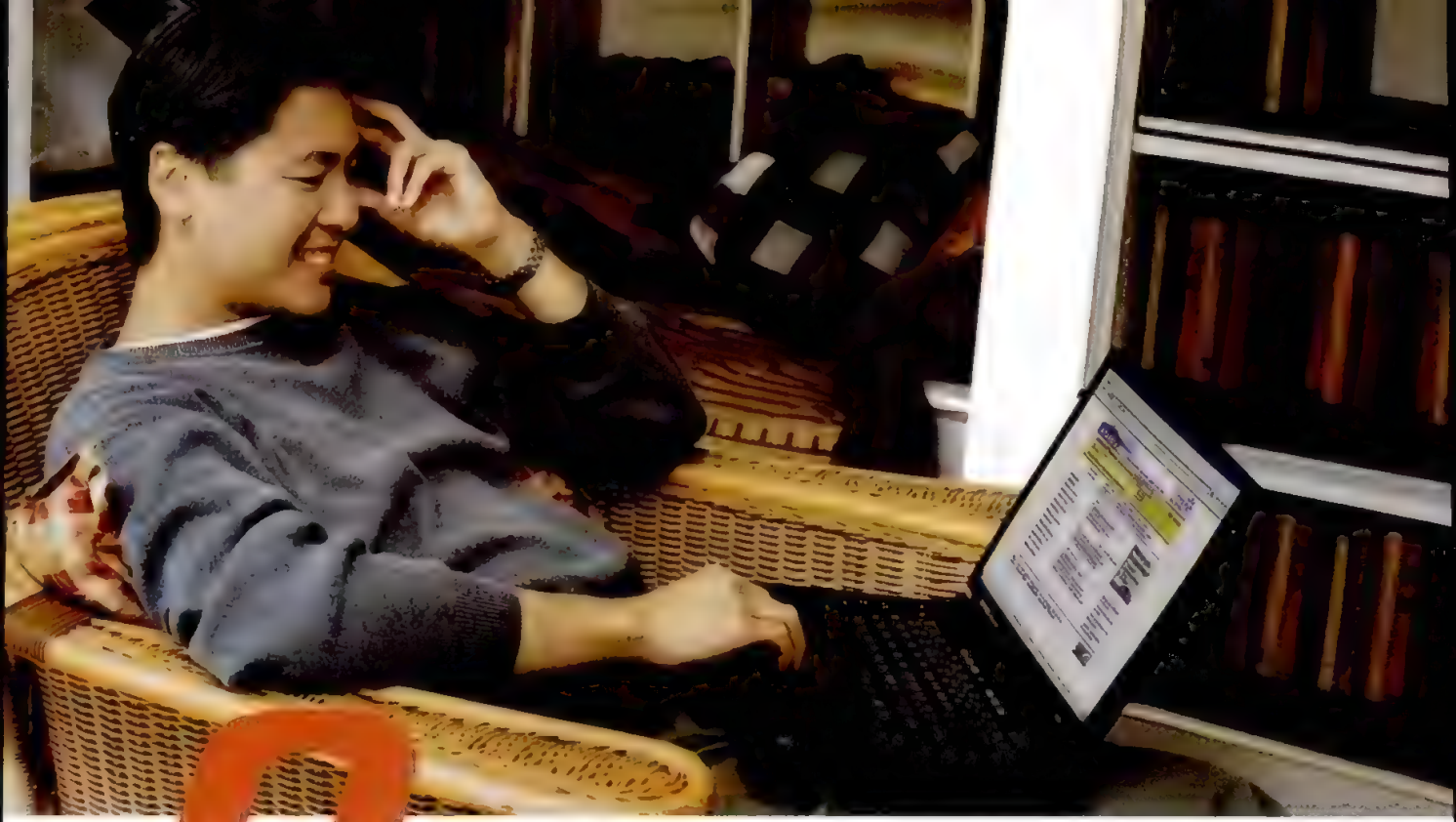
One of the most popular activities on portals and financial centers is watching the stock market and, using personalization, your own portfolio. CBS MarketWatch, MSN MoneyCentral, Quicken.com, Yahoo!, and ZDII Inter@ctive Investor all offer this type of personalization. The most comprehensive, MSN MoneyCentral's Portfolio Manager, can track up to 5,000 stocks in multiple portfolios; receive up-to-the-minute news, pricing, and analysis; get alerts about events like splits and earnings reports; and customize them to receive data on just about anything.

Another popular service available on most portals, is calendaring. Also, many sites—such as Magical Desk, Planet All, and Schedule Online—specialize in calendars. As usual, you need to register, and then these sites let you track the meetings you need to attend, the games you want to watch, the birthdays you can't forget.

NEWS YOU REALLY CAN USE

One of the first major content providers to recognize the potential of personalization, CNN Custom News lets you choose from 2,000 categories of news sources. Your custom page includes sections much like a newspaper and has a Java-based ticker with personalized news, stocks, sports, and weather. The Custom News site uses the Oracle ConText engine, which employs natural-language processing to index, search, and summarize news in real time.

These customized features are useful, but as more sites start to offer them, personalizing each one becomes a tedious prospect. Microsoft thinks it has come up with a solution, based on the Passport technology. Microsoft Passport stores your profile on a central server and provides a single log-on for Passport-enabled Web sites. You control what portions of your profile each site can see. So



Shown here: Presario 1800T Internet Notebook PC.

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far, Passport works only with a handful of Microsoft-owned sites (MoneyCentral, MSN HomeAdvisor, and Hotmail), but it will soon work on all MSN channels and eventually on other sites as well.

NEW NEWS TECHNOLOGY

While content sites continue to build new services based on keywords or collaborative filtering, other companies are conjuring up new ways of anticipating more accurately what information you need. Perhaps the most promising technology comes from Autonomy, which has devised a method of extracting concepts from content by using statistical probabilities and pattern matching. Autonomy evaluates personal profiles, content, and queries in the same manner. It then compares the extracted concepts and provides relevant content matches.

LineOne, the online outlet of Rupert Murdoch's News Corp., showcases Autonomy's technology. As you view a news story, LineOne uses Autonomy's Content Server and dynamically generates links to related stories. This feature works much like Alexa Internet—parts of which are now included in the most recent versions of browsers from Microsoft and Netscape—but unlike Alexa, which relies on a predefined database of related sites, Autonomy generates its list of links in real time.

If you frequently track specific subjects, you can train LineOne agents to gather all related stories by typing in a sentence or series of words. When you invoke your agent by clicking on its link, Autonomy presents a list of hyperlinks. At first glance, we found that many document titles seemed unrelated, because Autonomy searches according to concept rather than just the keyword. On closer examination, we found Autonomy to be uncannily accurate. Expect to see many other content-based sites adopt Autonomy in the near future, including Associated Press, BBC, Reuters Plus, and Xoom.

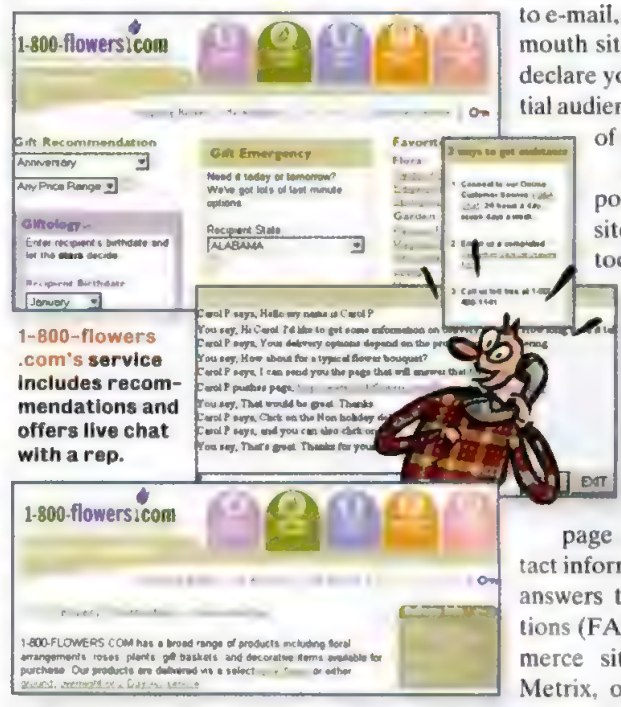
Unlike Autonomy, which can be more easily grafted onto an existing Web site, some content-personalization packages require a little more work and a larger commitment. Examples include BroadVision's One-To-One line and Vignette's StoryServer, which are both touted as complete solutions for Internet Relationship Management. These products not only seek to deliver customized content to Web site visitors, they also help their customers make business decisions by providing an environment for managing content, exchanging content with partners, and analyzing behavior of site visitors. To see Vignette's StoryServer in action, check out Atevo Travel, the *Chicago Tribune*, or our own ZDNet site. The *Milwaukee Journal Sentinal's* City Pages Plus is a good example of BroadVision's One-to-One solution.

Eventually, content-personalization tools will grow so advanced that they will become transparent. You'll simply see the information that you need or that interests you as you jump around the Web. Although the Web continues to grow at a mind-boggling rate, this technology will help ensure that it feels like home to you.

The Service You Deserve

By David Lidsky

Think about what you can accomplish in two days. In the Internet age, 48 hours seems like an eternity. Now consider that two-fifths of the Web's leading sites can't respond to your e-mail in that amount of time. A recent Jupiter Communications study showed that only 59 percent of 125 of the most prominent sites in the areas of content, travel, retail, financial services, and consumer brands responded to e-mails within two days. In the rush to get online, many businesses have forgotten about customer service and the opportunity the Web offers to forge personal relationships with customers.



1-800-flowers.com's service includes recommendations and offers live chat with a rep.

This seems odd, because businesses have an incentive to offer good service online. In the old days, say 1990, if you had a bad experience with a product or service, studies show that you would tell perhaps nine other people. Today, thanks to e-mail, newsgroups, and word-of-mouth sites like Deja.com, you can declare your displeasure to a potential audience of 90 million with a click of the send button.

Sites that offer online support are turning to intelligent site design and automation tools that can handle large volumes of e-mail in a cost-effective manner. At some point, though, sites must make sure that users can contact a knowledgeable human being.

As a minimum, a site should have a support page that provides phone-contact information, e-mail, and a set of answers to frequently asked questions (FAQs). Of the top 20 e-commerce sites, according to Media Metrix, only 7 post toll-free telephone service (many of these are preexisting businesses, such as Dell and Columbia House, which later added Web sites). Of the purely Web-based businesses, we found that Buy.com and Garden.com published their phone numbers right on their home pages. Next-best, Amazon.com and Beyond.com display phone numbers one level deep, on the customer-service page.

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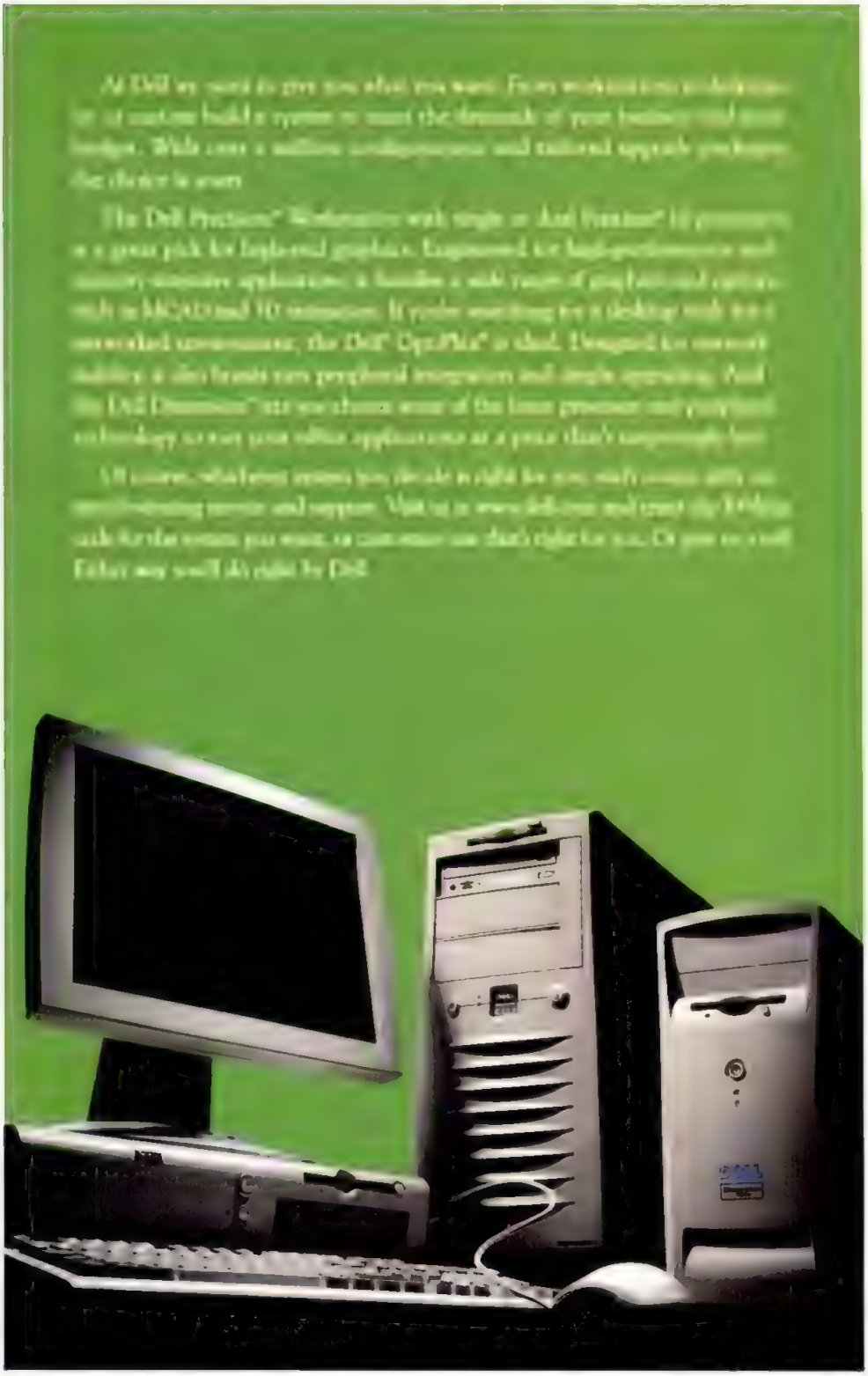

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$3579

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- 32MB SDRAM
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$1999

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E•VALUE CODE: 04163-890919

DELL INSPIRON 3500

Light Weight, Light Price

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- 14.1" XGA Active Matrix Display
- 64MB SDRAM
- 4.8GB[4] Ultra ATA Hard Drive
- Modular 24X Max[7] Variable CD-ROM and Floppy Drive
- NeoMagic® MagicMedia™ 256AV AGP Video
- 3D Surround Sound with Wavetable
- Lithium Ion Battery
- Microsoft Office 2000 Small Business
- MS Windows NT Workstation 4.0
- 3-Year Limited Warranty[2]
- McAfee VirusScan 4.02
- ★ *Upgrade to 3-Year NBD On-site[3] Service, add $99*

$2399

Business Lease[15]: $80/Mo., 36 Mos.

E•VALUE CODE: 04163-890923

DELL INSPIRON 3500

Light Weight, Light Price

- Intel® Celeron™ Processor at 366MHz
- 14.1" XGA Active Matrix Display
- 32MB SDRAM
- 4.8GB[4] Ultra ATA Hard Drive
- Modular 24X Max[7] Variable CD-ROM and Floppy Drive
- NeoMagic® MagicMedia™ 256AV AGP Video
- 3D Surround Sound with Wavetable
- Lithium Ion Battery
- Microsoft Works Suite 99 with Money 99 Basic
- Microsoft Windows 98 Second Edition
- 3-Year Limited Warranty[2]
- McAfee VirusScan 4.02
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$1799

Business Lease[15]: $60/Mo., 36 Mos.

E•VALUE CODE: 04163-890917

DELL LATITUDE CPi R

Network-Optimized Notebook

- Pentium II Processor at 400MHz
- 14.1" XGA Active Matrix Display
- 64MB SDRAM (512MB Max[13])
- 4.8GB[4] Ultra ATA Hard Drive
- Modular 24X Max[7] Variable CD-ROM
- Modular Floppy Drive
- MagicMedia™ 256ZX
- 3D Surround Sound with Wavetable
- Lithium Ion Battery with 1-Hour ExpressCharge™ Technology
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- Touchpad
- 3-Year Next-Business-Day On-site[3] Service
- ★ *Upgrade to 96MB SDRAM, add $99.*

$2899

Business Lease[15]: $97/Mo., 36 Mos.

E•VALUE CODE: 04163-790928

DELL LATITUDE CPt

Network-Optimized Notebook

- Intel Celeron Processor at 400MHz
- 14.1" XGA Active Matrix Display
- 32MB SDRAM (512MB Max[13])
- 4.8GB[4] Ultra ATA Hard Drive
- Modular 24X Max[7] Variable CD-ROM
- Modular Floppy Drive
- MagicMedia 256ZX
- 3D Surround Sound with Wavetable
- Lithium Ion Battery with 1-Hour ExpressCharge™ Technology
- Microsoft® Windows NT® Workstation 4.0
- Touchpad
- 1-Year Next-Business-Day On-site[3] Service
- ★ *Upgrade to 64MB SDRAM, add $99.*

$1899

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E•VALUE CODE: 04163-790918

DELL NOTEBOOK AWARD INFORMATION

- Inspiron 3500 C300XT – *PC World*'s Best Buy in the budget category, 6/99, 7/99.
- Latitude CPi A366XT – *PC World*'s #1 Best Buy Power Notebook, 6/99,7/99.
- Latitude CPi Series A366XT– May *Windows Magazine* List Fastest Performance, 5/99, 7/99.
- Inspiron 7000 A366LT – *PC World*'s Best Buy Power Notebooks, 8/99.
- Latitude CPi Series 366XT – 5-Time Survivor of *PC Computing*'s Annual Torture Test, 3/99.
- Latitude CPt C400 GT *PC Magazine's* Editors' Choice Award,8/99.
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- Canon BJC-50 Portable Printer, add $349.
- Infocus LP 400 Ultra Portable Projector, add $3025.
- Targus Defcon Security Device, add $49.
- Auto/Air Power Adapter, add $99.
- APC Notebook Surge Protector, add $29.
- iomega Clik! PC Card Drive,add $219.
- WinFax Pro v.90 $105.

intel inside

pentium II

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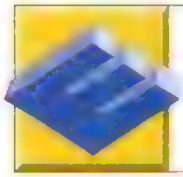

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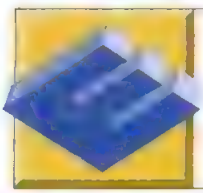
intel inside
pentium III



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$5349

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E•VALUE CODE: 04164-290953

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- 512KB Integrated L2 ECC Cache
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- 40X Max[5] Variable SCSI CD-ROM Drive
- HP OpenView NNM Special Edition
- Intel Pro/100+ PCI Ethernet Adapter
- Integrated Ultra-2/LVD and Ultra/Narrow SCSI Controllers
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- Hard Drive Bays: 4-1.6" or 6-1"
- 4 Media Bays: 3-5.25", 1-3.5"
- 3-Year Next-Business-Day On-site[3] Service
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Business Lease[15]: $67/Mo., 36 Mos.

E•VALUE CODE: 04164-290919

DELL POWEREDGE 1300 SERVER
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Entry-Level Server

- **Pentium III Processor at 450MHz**
- 64MB 100MHz ECC SDRAM
- 512KB Intergrated L2 ECC Cache
- 9GB[4] (7200 RPM) Ultra-2/LVD SCSI Hard Drive
- 32X Max[6] Variable EIDE CD-ROM Drive
- HP OpenView NNM Special Edition
- Intel Pro/100+ PCI Ethernet Adapter
- Integrated PCI Ultra-2/LVD SCSI Controller
- 6 Expansion Slots: 5 PCI, 1 PCI/ISA
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- 3-Year Next-Business-Day On-site[3] Service
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- *Computer Shopper* "Top 100" – Dell PowerEdge 2300, 11/98.
- *PC Computing*'s "The 'A' List" – Dell PowerEdge 6300, 11/98.
- *LANTimes* "The Best of *LANTimes* Over $25,000"– Dell PowerEdge 6300, 9/98.

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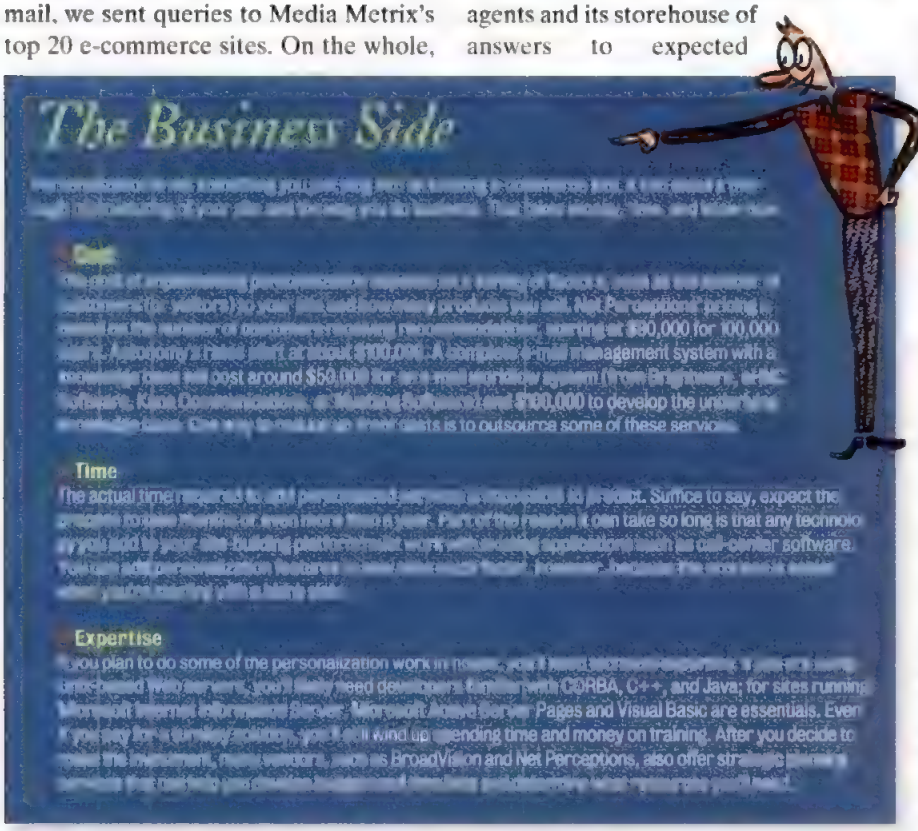
is usually the FAQ section. But FAQs are often difficult to navigate or daunting in scope. One effective solution is a searchable FAQ. Dell, for example, has implemented Ask Jeeves' natural-language technology to create Ask Dudley, a place where you can ask questions about your computer (for example, "How do I install a sound card?") and get pointed to the area in the site with your answer.

E-MAIL SERVICE SCORECARD

When you've exhausted the self-service support options, the predominant method for getting help online is e-mail. To see for ourselves how responsive sites are to e-mail, we sent queries to Media Metrix's top 20 e-commerce sites. On the whole, we were pleasantly surprised. Most sites did get back to us within two days and with answers that satisfied us.



The best responses came from Amazon.com and Buy.com. Electronic greeting-card sites Blue Mountain Arts and eGreetings each took slightly longer than 48 hours, but the worst offender was CDNow, which took 17 days to reply to our e-mail message.

E-MAIL OVERLOAD

Typically, a support representative can handle 50 to 200 e-mails a day. eBay implemented an e-mail system from Kana Communications when it was receiving about 5,000 messages a week; today it gets blitzed with 100,000 e-mails a week. Sites that receive more e-mail a day than can reasonably be handled by one person may turn to an e-mail management system that lets a computer respond to common questions, freeing up support reps to tackle the tougher queries.

Automated e-mail response systems generally involve three components: a knowledge base, artificial intelligence (AI), and a queuing or routing function. A knowledge base is the accumulated experience of a site's customer-service agents and its storehouse of answers to expected queries from customers.

Virtual customer-service agents analyze and act on incoming messages based on predefined business rules, case histories, keywords, patterns, and concepts, as well as AI. The system then dips into the knowledge base to find a response. If the virtual agent determines, with a high degree of certainty, that it has the correct answer, some systems may let it respond to your note automatically. If the virtual agent isn't quite sure, it can either send you a range of possible answers or forward that range to a customer service rep.

Because the virtual agent has read your note and can be programmed to dig into the database to look at your customer history, it can personalize the note, and you may have no way of knowing that a person did not handle the response. Usually the only way to know that you're not dealing with a human is that you'll generally receive this type of response in just a few minutes as opposed to a few hours or days.

Different Web companies use automated e-mail response systems in different ways. For instance, both Suretrade and Charles Schwab use eHNC's Select-Response. Suretrade can offer a low price for electronic trades ($7.95), because it relies on virtual e-mail agents to respond automatically to 70 percent of inquiries. The other 30 percent get routed to live brokers. At Schwab.com, you're paying $29.95 a trade, so you expect excellent personal customer service and no auto-responses. All of your e-mail inquiries go through the knowledge base and get routed into a skill-based queue, so that the best person answers your question.

THE NEXT-BEST THING TO BEING THERE

You're shopping on a Web page and have a question you want answered in seconds. The latest trend in online customer service is live, Web-based customer support using text chat, so you get the immediacy that you're used to in the real world. You'll usually see this implemented as a button or a link that offers live help. The application then opens in a frame on the page or in a separate browser with a chat window where you communicate with the rep—who typically can control your browser, steering you to what you were looking for. The need for this type of application is clear: 83 percent of Internet users say they're dissatisfied with site navigation, according NetSmart Research.

Don't expect to see live customer support very often. It will generally make sense for sites to use live support only as a selling tool, particularly for more expensive items. 1-800-flowers.com prominently offers live support on its site to help you choose the right bouquet or gift.

Overall customer service on the Web is improving, and as more of these technologies take root, with any luck, the era of two-day or longer waits for a response to a simple question will be over. PC

START Here

by Alan Cohen

EVERY DAY, THE WEB KEEPS GROWING. That's good news—for the most part. More sites means more information and more services online. But it also means more content to wade through—and a lesson in frustration if you don't know where to start. That's where Web portals and search sites can help. No one of these tools is perfect, but as a category, they're doing a better and better job of bringing you the best of the Web.

How they bring it to you differs, though. Portals take the one-stop-shopping approach, offering the Web's greatest hits at a single location. When we last looked at these sites, a year ago, portals offered e-mail, chat rooms, message boards, news, stock quotes, and sports scores—all perfectly useful features. But most users could find these functions at a handful of a bookmarked sites, so while portals were handy, they were not quite indispensable.

That's rapidly changing. Today, the best portals are fat with features, offering tools such as calendars, universal shopping carts, clubs, and voice mail. What's more, these applications—to varying degrees, alas—make the most of the integration, interaction, and ubiquity that have come to define the Web. Calendars can be shared; address books are integrated with e-mail; instant-messaging clients alert you to incoming e-mail. And everything can be accessed from any computer, anywhere, as long as it has an Internet connection. Little wonder, then, that portals such as AOL, Yahoo!, MSN.com, and Excite are consistently among the top ten visited sites on the Web, according to data from Media Metrix. By offering integrated, portable services that really add value to your day on the Web, portals have become more than just good places to start; they're good places to stay.

Of course, there still will be times when you want to stretch your wings. This is where search sites come in: These tools are the guides of the Web, asking you where you'd like go and then sending you on your way. Some of the most popular portals—Yahoo! and Excite, for example—got their start as search tools, and they can still get you where you want to go in the expanding reaches of cyberspace. But keep an open mind: You can find similar and sometimes more appropriate tools beyond the portals. Leaner sites such as About.com, Ask Jeeves, Google, and Northern Light are still works in progress; while usually adept, they will steer you into an asteroid on occasion.

Should you stay or should you go? That's a question we'll leave to the Clash—and to your particular needs. Where we can help is in finding the starting point. What follows is a look at how 8 Web portals and 15 search sites stack up. You can start right here.

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Our Contributors: EDWARD MENDELSON is a contributing editor of *PC Magazine*. NANCY SIRAPYAN is *PC Magazine*'s librarian. GARY GUNNERSON is an IT architect at Gannett Corp. and a frequent contributor. MICHAEL CLARK, ALAN COHEN, AKWELI PARKER, EYAL RABINOVITCH, and BRECK WITTE are freelance writers. JAY MUNRO was the project leader, and staff editor DOUG BEIZER was in charge of this story.

The POWER is out there...

and you can get it. The power the Web has to improve your life. You have to avoid the dreaded lame sites and time wasters, but one of the portals that ties together all its features can give you the power. Meanwhile, in breakfast nooks and offices everywhere...

ILLUSTRATION BY MARK ZINGARELLI

Web Portals

The real story in portals this year is not the new features, though there are plenty of those: Calendars, clubs, and upgraded instant messaging are the latest must-haves. The real story is the way the parts interact—on a scale greater than ever. The best sites are more than just the sum of their features. They are integrated tools, where a company profile links you to SEC filings and news stories; where instant-messaging clients sound an alert when new e-mail arrives; where searches on movie titles bring up links not just to videos you can buy online but to fan pages and clubs hopelessly devoted to them.

Calendars are a good example of how far Web portals have come and where they are heading. Like e-mail, a calendar is a *sticky* application, a tool designed to keep you coming back. But calendars also show the power of integration. Chat room events, television listings, and all sorts of content can be pulled into the calendar and linked to still more information within the portal and without. E-mail reminders alert you to upcoming appointments. Calendars signal the future of the portal, too: They're an ideal entry point into e-commerce opportunities. When Aunt Mary's birthday rolls around, the portal will know, because you entered the event on your calendar. Expect an e-mail or instant message suggesting a book from Amazon.com or some flowers from FTD.com.

Expect to see greater integration soon. One thing is certain: The Web's next killer app will be coming to a portal near you.—*Alan Cohen*

AOL

www.aol.com

● For first-time Web surfers, AOL offers a tempting proposition: Taking the roles of both ISP and portal, AOL lets you load a disk or CD, type in a credit card number, and get instant access to content, e-mail, chat rooms galore, and the Web. But once you've dipped your feet in the water, those feet may start itching to wander—to portals like Yahoo!

True, AOL offers an unrivaled online community—it's the best place in the wired world to interact with other users—but it lags behind the best portals in just about every other respect. Personalization features are woefully lacking, navigation can be frustrating, and hot applications such as online calendars are nonexistent. AOL used to have an ace up its sleeve with its proprietary content. Now much of that content is available on the Web, so you don't need AOL to see it.

Indeed, if you don't care about chat rooms and message boards, any ISP and a browser pointed at Yahoo! or Excite will offer comparable and often better services than AOL, for the same price or less. The portals also let you personalize their pages to your liking. Good luck getting that on AOL! True, you can turn chat room sounds on and off or select colors and fonts for your e-mail, but each time you want the local news you have to select your city. Each time you want a weather update, you have to type in your area or ZIP code. That's annoying—and entirely unnecessary when any other portal on the Web, such as MSN.com, will put the same information right on its home page.

Reminders are available, but a full-scale calendar or personal information manager would be better. Navigation could also be improved. Version 4.0 does a good job of integrating the Web into AOL: You type a URL or AOL keyword in the same address line and use the same Forward and Back buttons to move between pages, whether they are from the Web or from AOL. But every page of AOL-specific content opens in a separate window. In no time, you'll find yourself with a lot of screens to manage. Web content, on the other hand, is presented in a traditional, browserlike environment. Each new page replaces the previous one—a far preferable system.

AOL is not without its charms, however. The jewel in its crown is its community. Chat rooms and message boards are ample and popular. They are also better organized here than at any other portal. Community tools are well integrated as well. Go into a chat room and you'll see a list of participants. Click on a name and you will instantly call up that person's profile. Click another button and send the person an instant message or add the name to your Buddy List. Yahoo! Messenger offers more bells and whistles, but AOL's Buddy List is easier to use and better integrated with the chat rooms.

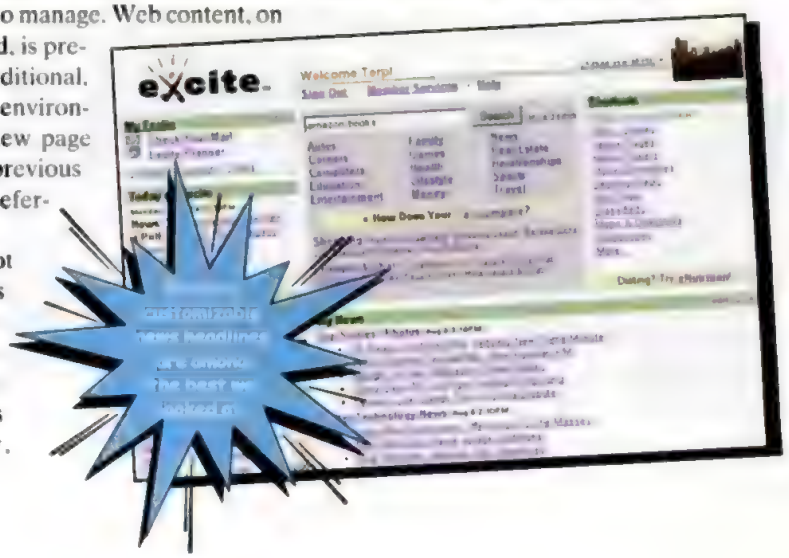
AOL's Web site, AOL.com, also does a good job of integrating chat rooms and instant messaging. This site, which can be personalized, is a portal in itself, with news, weather, classifieds, Web directories, and more. But for AOL subscribers, it's also a home away from home. Using the site's NetMail application, you can read and send AOL e-mail. The excellent AOL Instant Messenger (AIM) is also available here, and you need not be an AOL member to use it. AIM is worth the short download: With it, you can chat with AOL and AIM users alike.

On its proprietary service, AOL still has a long way to go in integrating content and tools. Of course, AOL 5.0 may get things right. But until then, let those feet wander.—*Alan Cohen*

Excite

www.excite.com

● *PC Magazine*'s Editors' Choice among Web portals in 1998, Excite remains a strong contender as a one-stop source of information, entertainment, and community. With new features like a calendar, voice mail, and a standalone utility called Excite Assistant that displays news and



mail alerts and plays Internet radio, Excite builds on its strengths in traditional features. Excite ranks among today's top choices, and your own needs will determine whether it's outclassed by hard-driving rivals like Yahoo!

Excite's colorful and highly configurable personal page appears automatically when you go to *www.excite.com*, unlike what happens at sites such as Yahoo! or Lycos where the site's main page is different from your personal page. The first item under the Excite banner is an icon that alerts you when new Excite Web-based mail arrives, and the "Today on Excite" box has a single news headline and four come-ons to less useful features, such as a daily poll and a link to a game area. Unfortunately, the remaining upper few inches of the page consist mostly of uneditable links to other parts of the site.

Unlike Yahoo!, Excite doesn't give you an option to move news, weather, stocks, or other information to the top of the page, so you may have to scroll down before you see any of the information you want. But the personal page is tightly integrated with the rest of the site, and you can always return to it or to any other important Excite page from a drop-down list at the top of most pages on the site.

A news tracker service finds many more items than Yahoo!'s comparable service does, but it won't send you alerts the way Yahoo! does. Stock alerts optionally pop up in the browser. When you add a sports team or stock to the list on the personal page, Excite doesn't automatically display news bulletins on that subject, but if you then customize your news listings, entries for news about the stock or team will instantly be added to the available choices.

Excite's e-mail (with 3MB capacity) lets you resize the message editor so that it fits inside your browser window. An option blocks mail from known spammers but doesn't let you block individual senders, as you can with MSN's Hotmail. For voice mail, you get a toll-free number with a personal ten-digit extension that receives messages and faxes after making your callers listen to an ad. Voice messages (limited to 60 per month) and faxes (10 per month) arrive in the same in-box with your e-mail; voice messages are played back through the RealAudio player, whereas fax images require a TIFF-file viewer.

Excite's basic-level calendar can't be made publicly accessible, as the ones in Yahoo! and Lycos can, and it isn't integrated with the reminder list on the personal page. The movie schedule page remembers your ZIP code, but the travel directions page doesn't remember your address as a starting point.

Chat (accessed through a Java applet) is accessible throughout the portal, including its clubs: Each private or public club can have its own chat room. The level of discourse in public chat rooms seems dismally low, but no worse than at other portals. The instant-messaging program supports conferences and gives you full control over which users can see you or send you messages. The voice-chat plug-in is moderately audible and supports private chat rooms.

Excite remains a contender, and it is the only portal offering voice mail and faxes. But if you haven't chosen a portal and don't need voice mail, you may prefer the efficiency and integration of Yahoo!
—Edward Mendelson

Editors' Choice

- Yahoo!

PC MAGAZINE EDITORS' CHOICE

As portals continue to offer more content, tools, and features, integration of all those elements becomes even more important. Not only does Yahoo! have some of the best tools and content, but it integrates them all better than anyone else, and so we award it our Editors' Choice.

No site does a better job of tying together various excellent services than Yahoo! The calendar, e-mail, My Yahoo! page, and instant messaging all work together seamlessly. News headlines often give you entrée into the richness of Yahoo!'s directory content as well as related chat rooms, message boards, and multimedia.

Last year's winner, Excite, remains a strong contender, but it lacks the comprehensive integration found at Yahoo! Still, Excite has some nice features, including free voice mail that can receive both voice messages and faxes.

GO Network

www.go.com

● There's plenty to see on GO Network, but the lack of integration makes all that content worth less. GO brings together the various Web resources of The Walt Disney Company, including ABCNews.com, Disney.com, ESPN.com, Infoseek, and MrShowbiz.com. Many of these sites—most notably ESPN.com and MrShowbiz—are top-of-the-line in their field, so right off the bat, GO benefits from some first-rate content. But the GO family is an insular one, with little material from outside resources.

Worse, tools are lacking: There is no calendar, no auctions, no buddy lists. Chat rooms and message boards are underused. But perhaps GO's biggest problem is that it fails in two essential areas: personalization and integration of features, which you find with Excite and Yahoo!

When it comes to personalization features, GO ranks near the bottom of the pack. You can have news, stock portfolios, sports scores, horoscopes, local weather, and lottery results on your page, but those are basics, and as far as GO, well, goes. There is no personal planner, not even a place to list your favorite sites, as you have with MSN and even AOL.com. You also have limited control over the page's format. This is bare-bones personalization, just slightly better than AOL.

And while ABCnews.com and ESPN.com do an excellent job of providing news and sports information, respectively, GO would benefit from more diversity. For breaking news, the only other source available is Reuters. That's a far cry from Yahoo!'s Full Coverage, which takes the day's top events and provides links to news and material from all over the Web.

GO Money, the financial area, is similarly limited. You can create a stock portfolio, track stocks, and have access to content from TheStreet.com, Reuters, Businesswire, and PR Newswire. But

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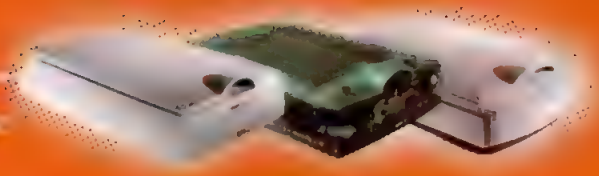

www.agfahome.com

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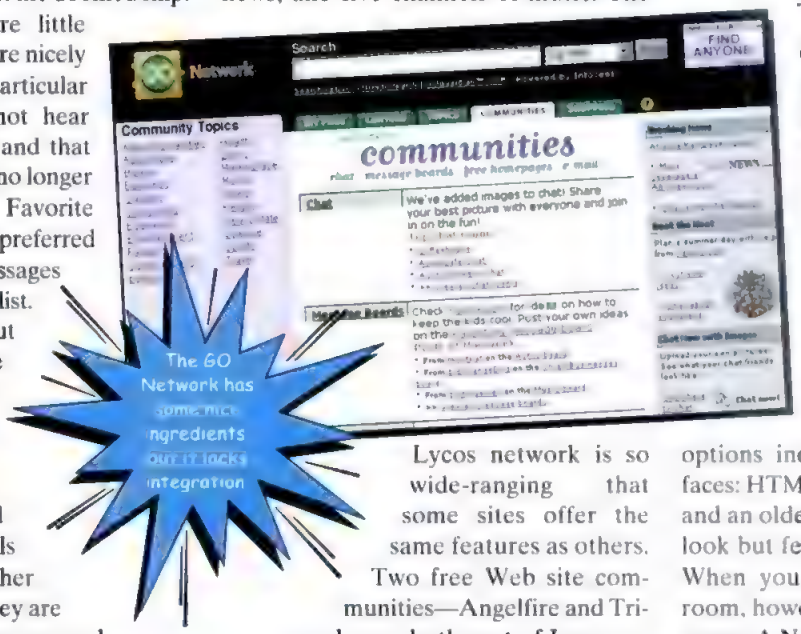
integration with the rest of the Web is minimal. A Reuters story about Pepsico, for example, does not even include a link to the company's site. Things are a bit better at GO's personal page, which not only tracks your favorite stocks but also links to company message boards.

Still, integration within GO is poor on the whole. GO seems more a collection of sites than a truly integrated portal. When you visit the sports channel, you'll get ESPN.com content with a few links to related GO chat rooms. When you visit the entertainment channel, you'll get Mr. Showbiz content with a few links to GO message boards. If you want to search for something by keyword, you'll be taken to Infoseek. Search for *Titanic* and you'll get a list of sites on the Web—but no prominent links to related GO content, no links to books or videos about the doomed ship.

Message boards are little used on GO, but they are nicely designed. If there is a particular poster you'd rather not hear from, click on Ignore and that person's messages will no longer appear on-screen. Favorite posters can be assigned preferred status, so that their messages will go to the top of the list. It's a nifty feature but would be more valuable if more users participated. Chat, too, suffers from low attendance. Few rooms are active at any given time. And instant messaging falls short. You can IM other GO users only when they are in the same chat room as you, and there's no way to keep tabs on buddies.



GO's e-mail offers most of the essentials, such as folders, address books, and a spell-checker, but it falls short of portals like Yahoo! and MSN.com that let you check external mail. Its 3MB mailbox limit is 1MB larger than MSN's Hotmail's, however, and equal to Yahoo!'s. But Hotmail lets you set up more complex filters and offers a better and more appealing user interface.

The shopping channel's price finder, like most shopping bots, is something of a work in progress. It will scour GO's network of merchant partners for prices on books, videos, consumer electronics, and so on, but the roster of vendors queried is not comprehensive (Amazon.com and barnesandnoble.com were missing from the list of booksellers, for example), so you can't really be sure that you're finding the best price on the Web.—*AC*

Lycos

www.lycos.com

● If you're the kind of person who never cleans up your room, Lycos may appeal to you as a portal. But most users will prefer better-organized sites like Yahoo!, Excite, and Netcenter.

Instead of a tightly integrated set of sites and features, you'll find a huge network of loosely connected sites, including a personal page, a calendar that can be public or private, radio applets for news, and five channels of music. The Lycos network is so wide-ranging that some sites offer the same features as others. Two free Web site communities—Angelfire and Tripod—are both part of Lycos, as are two search engines, HotBot and Lycos itself. You can find almost anything on Lycos, but it won't always be easy to decide where to go or how to find your way around.

The main Lycos page consists mostly of a list of categories like News, Health, and Shopping. When you click on a category, a page opens listing Lycos-created guides to the top Web links organized by subcategory, related Lycos clubs and message boards, selected Usenet news groups, and links to book titles.

Lycos's main page also offers a small search form and a link to an advanced search page that lets you choose whether to search the Web, Lycos message boards, stock symbols, MP3 files, or other categories. You must choose to search either all those categories or only one at a time, however. Many pages include a navigation bar leading to other Lycos pages, but don't count on finding it everywhere, and expect it to disappear when you get below the top level of Angelfire and other connected sites.

The My Lycos personal page can be configured from a drag-and-drop interface, but without the depth of detail you can find by digging down in Yahoo! You can place a calendar and stock portfolio on the personal page, but the minimal calendar has no connection from the full-featured MyTime calendar elsewhere on the site. And the stock listing cannot display your portfolio's total value.

Lycos's free e-mail (MailCity) gives you 4MB of available space (more than we found anywhere else) and convenient links to another Lycos site, WhoWhere.com, which lets you search for an e-mail address and add it to your address book with one click. Long-term Lycos users who signed up for the old Lycosmail.com service can still use that.

Extensive chat-room options include three different interfaces: HTML, a new "Java Light" applet, and an older Java applet with a clunkier look but features similar to Java Light. When you enter a Lycos club's chat room, however, yet another chat applet opens. A NetClubs Neighborhood applet also opens for instant messaging among club members, but you can use it to connect only with other club members, not with other Lycos users.

Free home pages are available on Lycos's Angelfire and Tripod services, each supporting wizard-style page building and an option to upload HTML pages from your hard disk. Angelfire offers

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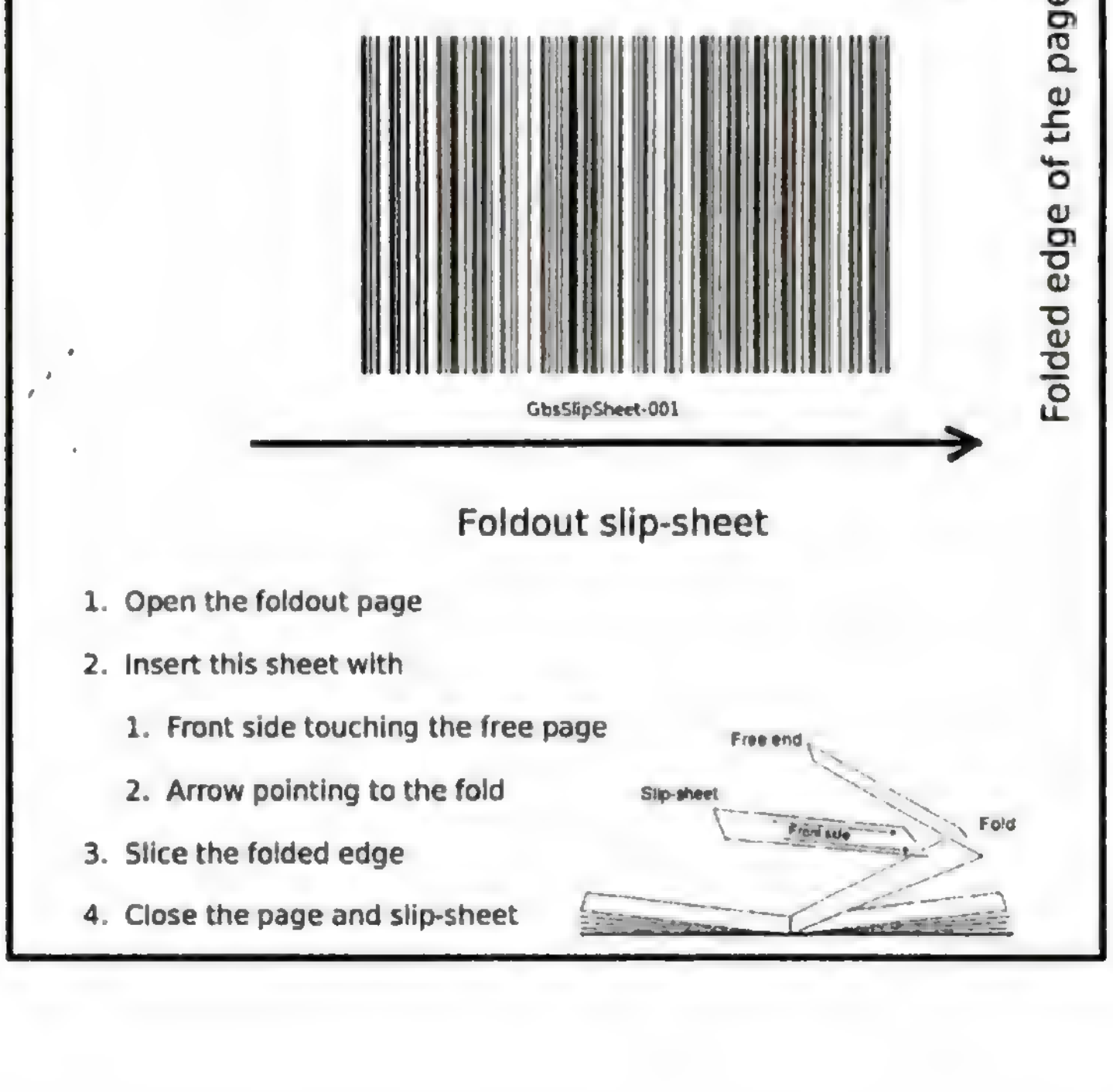
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To test Web portals, we first identified what to us is the essence of the portal experience—applications such as Web-based e-mail; how well a site offers you Web content and directs you to it; community features such as message boards; e-commerce; and the thread of integration, navigation, and personalization that ties all of these together.

We then set out to evaluate how well each site fulfills its mission. A Web portal is supposed to be the first site you see in the morning and the place you come back to again and again throughout the day to manage all of your daily Web activities. To that end, our team of writers, editors, and labs staff used each of these sites at one point or another throughout the course of our month of testing as a home page and as a place to check e-mail, get stock quotes, and find specific information.

The ease with which we could accomplish any and all of the tasks we set out to do was of paramount importance in our analysis. Such tasks include setting up personalization elements and getting from one area of the site to another. An additional major consideration was how well the site tied together all of its disparate elements.

	AOL	Excite	GO Network	Lycos	MSN.com	Netcenter	Snap.com	Yahoo!
NETWORK								
Integration	Fair	Good	Poor	Poor	Fair	Fair	Fair	Excellent
Navigation	Fair	Good	Good	Fair	Good	Good	Good	Good
Personalization	Poor	Good	Poor	Good	Fair	Good	Good	Excellent
APPLICATIONS								
Web-based e-mail	Fair	Good	Fair	Excellent	Excellent	Good	Good	Excellent
Web-based calendar or PIM	N/A	Excellent	N/A	Good	N/A	Good	Good	Excellent
CONTENT								
Directory search	Fair	Excellent	Fair	Good	Good	Good	Good	Excellent
Keyword search	Fair	Good	Fair	Poor	Excellent	Fair	Fair	Good
Breaking news	Fair	Excellent	Fair	Good	Good	Good	Good	Excellent
Stocks and finance	Good	Excellent	Fair	Excellent	Good	Good	Good	Excellent
Software downloads	Good	Fair	Fair	Excellent	Good	Good	Fair	Good
Streaming audio and video	Fair	Fair	Fair	Good	Excellent	Fair	Fair	Good
CREATING COMMUNITY								
Chat and message boards	Excellent	Good	Poor	Good	Fair	Good	Good	Good
Instant messaging	Excellent	Excellent	Poor	Poor	Good	Good	Good	Excellent
Games	Fair	Excellent	Good	Good	Good	Fair	Fair	Good
Free home pages and communities	Good	N/A	Good	Excellent	Good	Fair	Fair	Good
SHOPPING								
Auctions and classifieds	Poor	Good	Fair	Good	N/A	Fair	Poor	Good
Comparison shopping bots	N/A	Poor	Fair	Good	Fair	Poor	Poor	Good
Travel	Fair	Excellent	Fair	Excellent	Good	Fair	Fair	Excellent

N/A—Not applicable. The site does not have this feature.

5MB of space and free e-mail, whereas Tripod offers 11MB and no e-mail but has its own chat rooms and other portal-like features, with an interface different from the ones on Lycos itself.

Lycos is no more chaotic than the Internet is (which is no compliment), but it is highly confusing if you're expecting an integrated portal.—*EM*

MSN.com

www.msn.com

● MSN.com may be the underdog site in our roundup—a promising portal that's not quite ready yet—but Microsoft is not your typical underdog. Indeed, when the company decides to focus on a market, it can rustle up the resources of a mini–Manhattan Project (after all, most Internet Explorer installations default to MSN as the home page). So keep an eye on MSN: Right now, it's no Yahoo!, but recent improvements such as user communities, improved search, and easy navigation have taken MSN a long way. And some of the top-flight features that the site already had, such as Hotmail, are now better integrated with other tools on the site.

Personalization has always been one of MSN's key strengths—and weaknesses. This remains the case. The start page is extremely easy to customize; just click the Change Content tab at the top of the screen to get started. From there, you type in your ZIP code (to get local weather and events), choose the types of content you want—such as news, sports, and personal finance—and click boxes to select the providers of that content.

MSN allows you to choose content from a host of A-list sources including *The New York Times, The Wall Street Journal*, CNN, and *TV Guide*—not to mention Microsoft-run sites such as MSNBC and Slate. But all you'll see on the start page is a list of links. And when you click on one of them, you go to an entirely new site, from which you have to click on the Back button to return to MSN. There's no integration between news stories, message boards, and chat rooms, as you'll find on Yahoo! Another problem is that there is a limit to what you can put on your start page. Unlike with Yahoo!, you won't be

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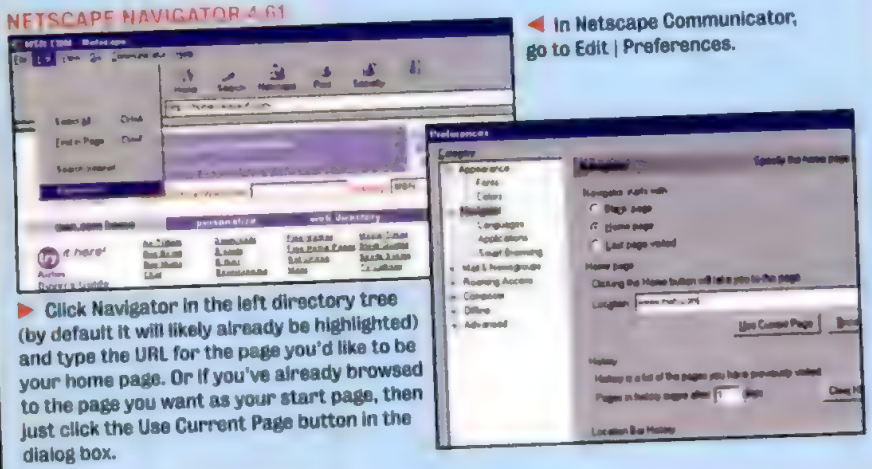
CHANGE YOUR HOME PAGE

If you're like most people, your browser probably still opens to its default page (usually your ISP's page or the page of your browser's manufacturer). In less than a minute you can set it up to open to any page you like. Here's how.

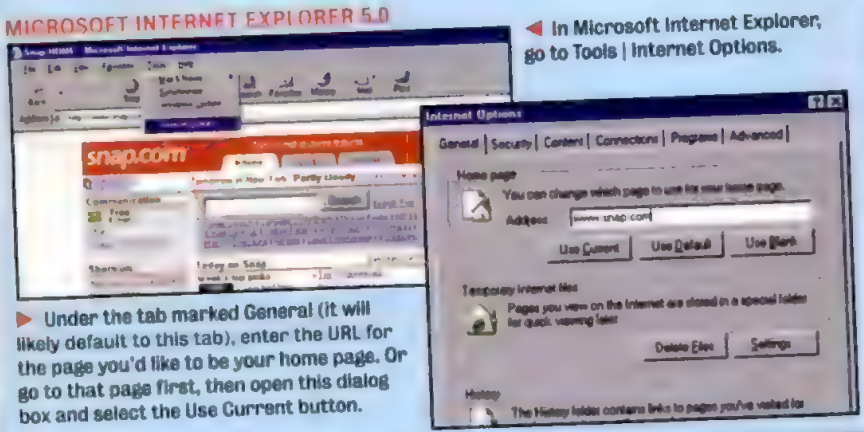
NETSCAPE NAVIGATOR 4.61



◀ In Netscape Communicator, go to Edit | Preferences.

▶ Click Navigator in the left directory tree (by default it will likely already be highlighted) and type the URL for the page you'd like to be your home page. Or if you've already browsed to the page you want as your start page, then just click the Use Current Page button in the dialog box.

MICROSOFT INTERNET EXPLORER 5.0



◀ In Microsoft Internet Explorer, go to Tools | Internet Options.

▶ Under the tab marked General (it will likely default to this tab), enter the URL for the page you'd like to be your home page. Or go to that page first, then open this dialog box and select the Use Current button.

able to track newsgroup postings or local movie listings here.

There's also no e-mail alert on the page. But Microsoft has an alternative: its MSN Messenger instant-messaging client. MSN Messenger tells you when new mail has arrived in your Hotmail inbox, but Microsoft needs to do some tinkering here. An alert pops up announcing the arrival and the sender of the new message, but it disappears after a few seconds, so if you happen to be away from your computer when the mail comes in, you'll never know.

Messenger is rather bare-bones—no file transfer, none of the text formatting you get with AOL Instant Messenger (AIM). Its user interface is not as sleek as AOL Instant Messenger's, and there are none of the buttons to check sports, news, and stock quotes that Yahoo! Messenger has.

MSN's new tabbed interface improves site navigation: Click a tab and go to Hotmail, Shopping, MSN Search, or the People section. Shopping is just a nicely formatted list of vendors, with a couple of links to useful resources, such as CompareNet. And the new MSN Search has a handy if not quite comprehensive directory of sites. MSN's chat rooms and message boards are still fledgling (read: sparsely populated) and a bit clunky.

From its People section, MSN's Communities are a clever takeoff—and improvement—on Yahoo! Clubs. In less than a minute, users can create permanent public or private areas in which friends, family, coworkers, or Web surfers at large can meet to chat and post messages on any topic.

MSN still has much to do. The recently acquired Jump calendar has yet to be integrated, and while personalization is easy, there needs to be more of it. Microsoft does not tend to play the underdog for long, but portals like Yahoo! and Excite have more features—and hordes of loyal users. We will be interested to see how loyal those users remain as Microsoft continues to build and improve MSN. And make no mistake: It will.—*AC*

Netcenter

www.netcenter.com

● Fire up your Netscape Navigator browser for the first time and in all likelihood you'll start at Netcenter. This tie has certainly helped Netcenter hold a huge slice of the Web-audience pie, because users leave it as their default doorway to the Internet (it will also work with Internet Explorer, of course). Laziness isn't the only reason to stick with Netcenter, though: Its connection to browser updates and plug-ins has great value, and Netcenter's bevy of business tools and channels give it even more worth. But a lack of community features such as online chat and message boards will likely make those looking for the complete online portal package go elsewhere before long.

One of Netcenter's unique aspects is that it is home to all the products associated with Netscape Communicator, a special if often unavoidable draw for millions of Web surfers. Navigator users will come back again and again for updates and plug-ins, for which Netscape has quartered off its Browser and SmartUpdate channels. Once you're updated and plugged in, Netcenter tries to hold you with unique features such as the eBusiness center, designed to help a small business establish a home on the Internet in seven easy steps. The eBusiness center also has seven channels to assist entrepreneurs with everything from buying office supplies online to marketing their businesses.

In addition, the customizable My Netscape page gives you as much interface customizability as any other portal.

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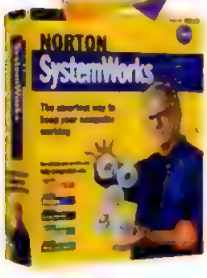

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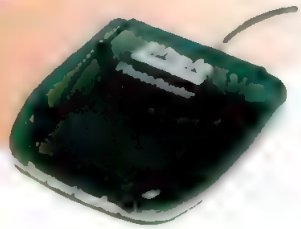

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Corporate Portals

You go to a portal like Yahoo! or Excite to get the information you need to manage your personal day: news, portfolio, e-mail, and more. Seeing the popularity of portals and the value of having a single place where you can communicate with coworkers, access data, and share information, companies are turning to what are known as corporate portals to deliver a Yahoo!-like experience for managing your business day.

Corporate portals provide simple user interfaces, using Web browsers to enable easy global access to the computing resources of a company. The browser's familiar interface makes using some of these resources less intimidating than the functional but complicated dedicated applications.

One key advantage of corporate portals is that they provide many hooks into existing data stores and can create customized Web views for different departments or project teams in the organization. Most IT departments could build something similar from scratch using Web application development tools. But buying a corporate portal solution jump-starts the process, providing better returns.

And companies will find no shortage of corporate portal vendors to choose from. Capitalizing on the buzzword *portal*, many vendors now claim to be corporate portal creators. Cut through the marketing hype, though, and you'll find only a few new companies, such as Actuate, Epicentric, Perspecta, Plumtree, and Portera, concentrating on straight portal plays.

ServicePort, from Portera, is an example of a vertical portal geared toward a consulting service. Intersections among calendars, projects, workspaces, and people allow for organizing a company.

Although the profile of a personal portal is pretty well established—content, commerce, community, Web applications such as e-mail—the components of a corporate portal are still being sorted out. See our checklist of prominent corporate portal options.

As yet, few portal products represent a one-stop solution for most companies. So you'll have to choose from this list to determine how many corporate data doors the vendor can open and securely control. And these systems don't come cheap—they usually start at $100,000, with the potential to escalate quickly from there—so most companies will want to start slowly with pilot projects and grow into their portals.

Xerox Corp., for example, chose to implement Viador's E-Portal Suite starting with a pilot for a specific group of decision-makers in a single business unit. This trial revealed potential obstacles, paving the way for fuller implementation in the company.

The hype surrounding portals may make you want to ignore the whole concept. To do so, however, would be to ignore some new possibilities for providing workers with the personalized content they need to make better decisions.—*Gary Gunnerson*

WHAT A CORPORATE PORTAL CAN OFFER

- ✔ PDA functions such as calendars, contact management, to-do lists, and group scheduling.
- ✔ Access to group documents and discussion groups based on the projects you're currently working on.
- ✔ Publishing and subscription capabilities.
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- ✔ Access to common business applications such as vacation/sick-leave reporting, a corporate travel database, and automated expense reporting.
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Snap.com

www.snap.com

Like Excite's, Netscape's My page is made up of a collection of windows, each dedicated to a certain bit of content, such as current headlines, your horoscope, or your stock portfolio, and each of these windows can be deleted or minimized straight from My page, like any window on your desktop. Netscape even lets you switch around the columns and the order of the features.

Personalizable channel options go beyond electronic versions of your daily paper to include a calendar and an address book. The calendar will e-mail all the appropriate people to remind them of an upcoming meeting, and the address book has integrated buttons to let you e-mail, call, or fax anybody listed in your personal directory. But you can't make your calendar public, and you can't create a to-do list next to your calendar as you can at Yahoo!

Netcenter shares some of its Web content with AOL, and it uses AOL's Instant Messenger software as its central online communication attraction. Unlike AOL, though, Netscape doesn't complement Instant Messenger with any of its own thematically driven chat rooms. This community failing is compounded by the lack of any message boards, the result being a glaring absence of any community feel.

For those looking for solid business tools and features, and for those who want to stay on top of new versions and plug-ins for Netscape, Netcenter is a good place to stay.—*Eyal Rabinovitch*

Snap.com

www.snap.com

In its bid to crackle and pop like portal titans Yahoo! and Excite, Snap.com has added lots of new features such as home page building, deepened its on-site content offering with its Web Guides, and integrated multimedia with its innovative high-speed–connection setting. But Snap's lack of a strong community feel, its poor e-commerce structure, and a few other missing features along the way leave it a little soggy in the end.

The most exciting and distinguishing feature of the site is its higher-speed setting. Just click on the link at the top of the page and your new interface adds a wealth of integrated multimedia content

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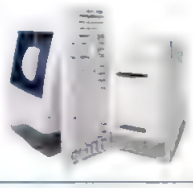

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that is absent from the default setting. You'll find streaming-video travel tours provided by Preview Travel, real-time financial news from Bloomberg Television, and live and prerecorded news from NBC, one of Snap's investors.

In addition, the high-speed interface is a huge space-saver. It relocates all of the Web directories and Snap-specific content that take up the whole low-speed page into one left-hand column that's dynamically expandable. Although the high-speed setting adds a dimension to Snap's content that none of the other sites in this roundup have, its integration into the site is still very limited. The only multimedia improvements are in the Home page and in a handful of channels that you can access from there, such as Travel.

Snap is the only site to dedicate a permanent tab to local content, which gives you local news and weather, as well as a host of community-based links and a list of upcoming events. Unfortunately, neither the Home nor the Local front page is customizable in any way. MySnap offers you standard personalization features, but it lacks both a calendar and an address book.

If you want shopping to be a key part of your portal experience, what you find at Snap may be disappointing. Unlike at Yahoo!, where you can buy directly through the portal site at multiple stores, the online shopping section of Snap is simply a list of links categorized by traditional e-commerce sectors.

Snap has most of the community building blocks in place, with auctions, online personals, chats, discussion boards, and personal home pages, but it lacks a key ingredient: a unique Snap flavor. For example, CityAuction provides the auction site and Xoom.com the home page building. Neither is customized in any way for Snap visitors or members. The chat and the discussion boards are the only authentically Snap community areas, and the numbers in both areas are dwarfed by those of AOL, Excite, or Yahoo!

All in all, Snap shows some promise with its exciting features and good general content, but there are enough missing pieces that it doesn't measure up as a one-stop portal.—*ER*

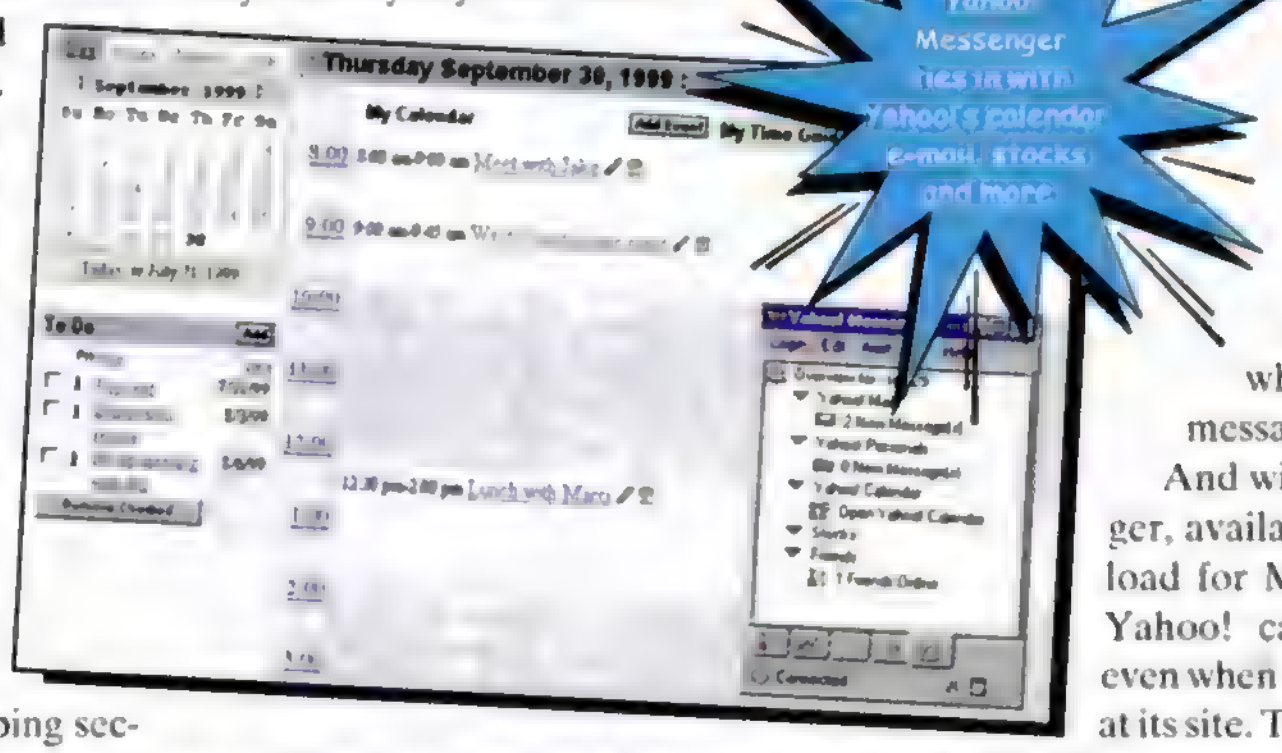
Yahoo!

www.yahoo.com

PC MAGAZINE EDITORS' CHOICE

We liked Yahoo! last year, and now we like it even more. Yahoo! has all the tools one expects in a portal—the calendar, instant messaging, personalized home page, breaking news, message boards, and chat rooms—but more important, it integrates them, and integrates them well. (Softbank, Ziff-Davis's parent company, is an investor in Yahoo!)

Some portals, most notably GO Network, simply tack new modules onto the old ones. Yahoo! looks more like a planned city, each part carefully positioned to interact with the others. It's a big city, with plenty of areas to explore. But the pathways and byways are intelligently laid out, getting you where you need to go quickly and efficiently.



Integration adds enormous value to Yahoo!'s many resources. For example, television listings provide more than times and channels. Click on a program and you will be given links to its official site, fan sites, interviews with the stars, news stories, and relevant Yahoo! message boards and clubs. Excite gives you just a summary and links to other summaries.

Better yet is the way Yahoo! handles the day's biggest news. While AOL and other sites will provide a couple of related links to go with a story, Yahoo! takes advantage of all its resources. At the Full Coverage area, Yahoo! provides links to a wealth of information, from news sources such as CNN and *The New York Times* to related Web sites, editorials, interviews, documents, video, audio (even better since the acquisition of Broadcast.com), and Yahoo! message boards and chat rooms.

There are other strengths as well. Yahoo! has done something more than integrating its resources; it has integrated itself into your Web surfing experience. No matter where you are, Yahoo! and its myriad features are just a mouse click away. Two new tools are responsible.

First is Yahoo! Companion. Go to *companion.yahoo.com* and you can set this up in less than a minute. You'll get a personalized toolbar that sits right below the address window on your browser. No matter what site you visit, Companion surfs with you. Buttons give you instant access to the Yahoo! areas and tools you use most, such as search, calendar, e-mail, news, stocks, and sports. An Alert icon lets you know when you have new messages at Yahoo! Mail. And with Yahoo! Messenger, available as a free download for Microsoft Windows, Yahoo! can be your portal even when you're not surfing or at its site. The name Messenger is a bit of a misnomer; instant messaging is just one of this tool's features. Alerts inform you when you have new messages at Yahoo! Mail and remind you of appointments on your Yahoo! Calendar. Click other buttons to check your stock portfolio or find out how the local sports teams are faring.

There are more welcome touches: Calendars can be shared and overlaid, simplifying appointment scheduling. Message postings include an icon telling you whether the poster is online and thus available for chat. (You don't get an instant link to send a message, however; you'll have to cut and paste the user's name into Yahoo! Messenger.)

For those looking for a home on the Web, Yahoo! offers some mighty fine real estate.—*AC*

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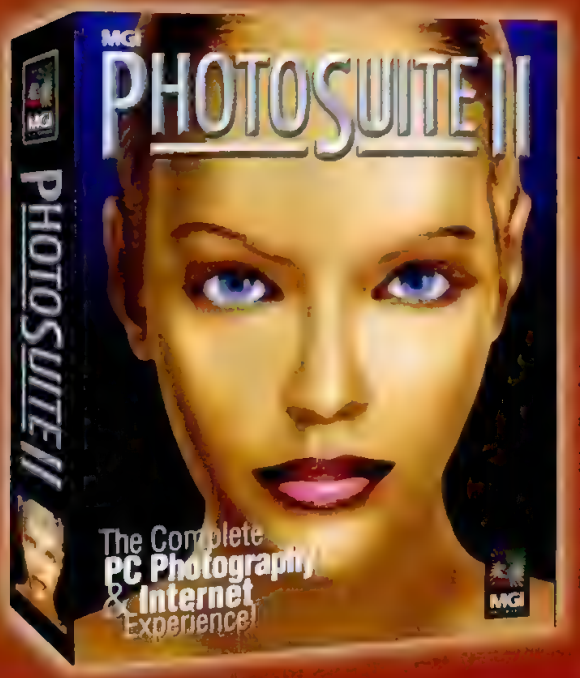

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Search Sites

It may be a cliché, but people often describe Web searching as looking for a needle in a haystack. The truth is, that's optimistic. According to a recent study by the NEC Research Institute, the Web now contains about 800 million pages, up from 320 million in December 1997. The total search engine coverage, however, has fallen from 60 to 42 percent, with no single engine indexing more than 16 percent of the Web, according to the study (Fast Search & Transfer claims its new FAST Search indexes 200 million URLs). Not to worry: Finding information on the Web may be difficult, but it's not impossible.

Although no single search engine will suit all your needs, you can put together a search arsenal that will help you with all your different types of queries. Sites such as Northern Light offer large indexes and extensive search options and will increase your chances of success with very specific queries. Web directories like Yahoo! are particularly useful for broad, topic-level searches. Popularity engines like Google and DirectHit (which is integrated into such sites as HotBot, Looksmart, and Lycos) can be real time-savers if you're looking for a very popular term and you just want one or two sites to answer your query—though they may miss sites that are highly relevant but less well known.

None of the search engines out there today are perfect, but using the right one at the right time can make all the difference.—*Nancy Sirapyan*

About.com

www.about.com

● Editors have opinions. About.com relies on this to help searchers find what they're looking for. Real people called Guides, whose names, faces, and qualifications are prominently displayed, pick the sites for any particular topic. About.com (formerly The MiningCo.) is not as comprehensive as Yahoo!, but the sites selected for inclusion do seem to have been chosen with care.

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Seeing behind the site's listings and getting opinions make using About.com more like leafing through a magazine than poring over an encyclopedia. You may not find what you want, but you're sure to learn something.—*Michael Clark*

AltaVista

www.altavista.com

● Long a favorite for power searching because of its large index and extensive search options, AltaVista now integrates anticipatory features such as related searches and Ask Jeeves, making it a viable option for more general searches as well. But it still lags behind competitors Hotbot and Northern Light in overall search quality.

We don't mean that AltaVista can't get the job done. You'll find it especially strong if your search needs are very focused, as with our look for information on the Texas Instruments TI-99. And for specialized needs, such as searching in a foreign language or finding multimedia content, AltaVista is the best site.

On our tests, however, we found that AltaVista clutters search results with multiple pages from the same site—something that HotBot and Northern Light have gotten around by clustering their results by domain. When we entered a search for *reform party*, for example, the first 20 hits that AltaVista returned were all different pages from *reformparty.org*.—*Nancy Sirapyan*

Ask Jeeves

www.askjeeves.com

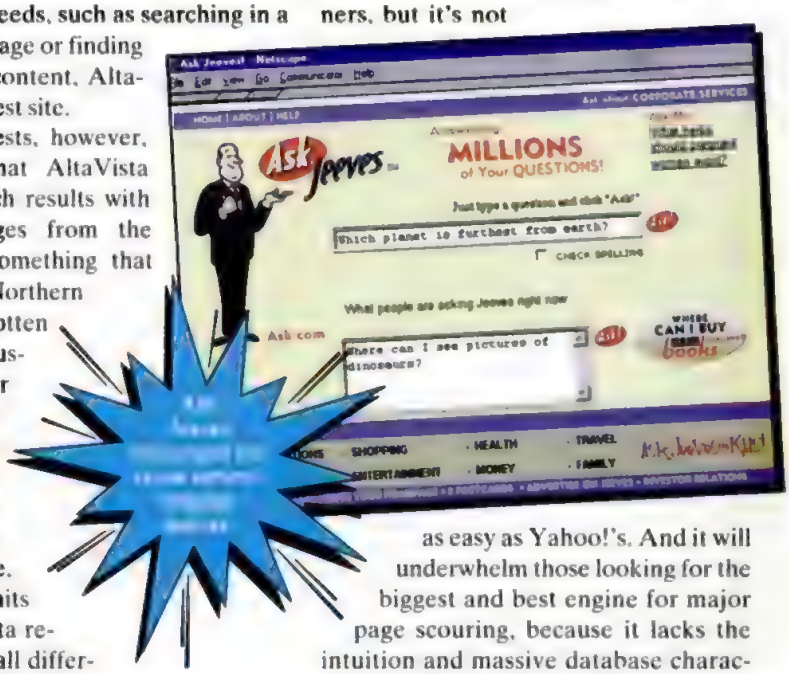
● With its knowledge base of answers and natural-language query capabilities, Ask Jeeves aims to be the site you turn to when you don't want to deal with complicated query syntax and overwhelmingly large result sets. Even though it sometimes falls flat, for very common queries it can produce excellent results.

At the core of Ask Jeeves is a knowledge base that contains common questions and links to more than 7 million answers. Ask Jeeves compares your plain-English query with templates within its knowledge base. It then returns questions that most closely match yours with links to the answers. Ask Jeeves works best with very common topics such as countries, movies, companies, or celebrities. As with Yahoo!, its goal is not to retrieve everything available but rather to find just one or two relevant sites. Yahoo!'s coverage is much broader, however, and it often succeeds where Ask Jeeves does not.—*NS*

Excite

www.excite.com

● In a crowded market, sometimes the worst place to be is stuck in the middle. Excite's search won't overwhelm beginners, but it's not



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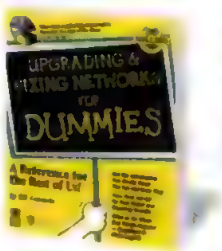

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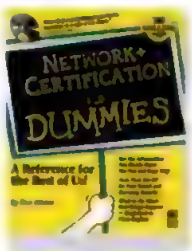

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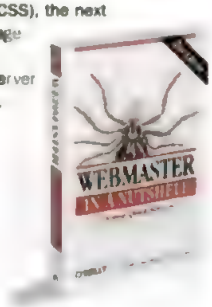

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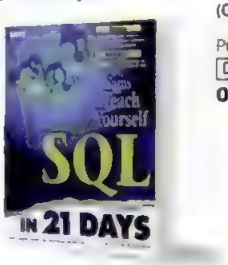

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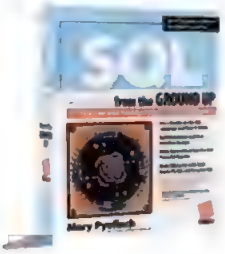

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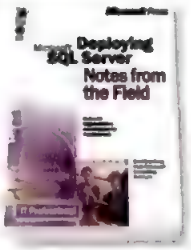

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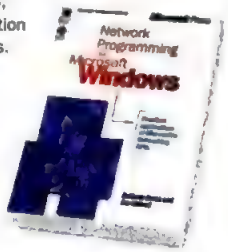

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tions. As we went to press, it announced a new search architecture addressing both of these limitations, which should be available by the time you read this.

Although Excite does a good job of anticipating common queries by offering related information such as stock quotes on company searches, it bombs out when you ask it to anticipate something more complex. For example, we searched for *alien species*, looking not for a galaxy of links to UFO and sci-fi sites but rather for information on foreign plants and animals that upset new ecosystems where they're introduced. Like Excite, AltaVista and Yahoo! found UFOs, but they also discovered kudzu, killer bees, and more. —*Akweli Parker*

FAST Search

www.alltheweb.com

● FAST Search is out to conquer the World Wide Web. But the young search engine that would be king isn't ready for the throne yet. Although FAST claims it catalogs 200 million unique URLs, more than any other search engine, recent estimates give the Web 800 million URLs. FAST hopes to catch up within a year. By then, there's no telling how many more pages there will be.

FAST shows promise, often turning up relevant sites quickly and efficiently. But FAST is not flawless. Relatively simple, focused searches seem to work best. Search on *e-mortgage* and you'll get 1,202 documents. All but one of the first ten responses were relevant. Add the parenthetical phrase *loan applications online* and the search halts at two hits, neither directly relevant.—*MC*

GO Network (Infoseek)

www.go.com

● When the chore is Web searching, GO Network does it with volume. Most queries top the million mark in responses, and the more detailed your query the more responses you get. But GO, using the search engine it acquired when it swallowed Infoseek, often finds exact matches in the first few returns. With so many sites pouring in, though, GO also delivers more duplicates and duds than other search sites do. And you won't find many effective query customization tools for the times when GO strikes out.

We found that simple one- or two-word searches consistently yielded fewer total returns than longer queries such as *syndicated political talk radio shows*. Wading through those returns can be work. You can use plus signs to force words to appear or quotation marks to force exact matches, but these tools will sometimes wipe out all results.

And yet if you ignore search syntax and the scary seven-figure return number, you'll find that GO delivers high-quality returns, often where other search sites get shut out. In our search for camping recipes known as *hobo dinners*, GO eased the hunger by finding two matches immediately.—*MC*

Google

www.google.com

● A googol is the numeral one followed by 100 zeroes. Google, the search engine that takes its name from that big number, luckily focuses on the 1 and not the 100 zeroes when it comes to search results. Google is strong competition for Yahoo! if you're looking for just one or two sites to answer your question. It has a knack for searching through its vast quantity of information and finding the specific piece you're looking for. What gives Yahoo! the edge is its excellent directory structure, which allows for serendipitous browsing of related subject categories.

On our tests, we found that Google (which is still called Google beta) has an uncanny knack for turning up relevant hits, giving us what we wanted on both general searches like *online calendars* and specific ones like *Debbie Davies*. Like Yahoo!, though, Google is less successful with narrowly tailored queries, such as "What is the chief export of Peru?" For that kind of problem, you'll have better luck with Northern Light.—*NS*

GoTo.com

www.goto.com

● Search results for sale! Whether you're looking to buy something or sell something, or neither, GoTo.com makes no bones about its commercial intent. The site is a progenitor of pay-for-display search engines.

GoTo's paying customers bid to have their sites show up at a certain rank for a given search query—usually paying a few cents for every person who clicks through to the site. (GoTo actually shows you what a click-through costs the advertiser.) If you're a consumer looking for product comparison information, this can prove a valuable time-saver. If you're a student trying to dig up scholarly information before a paper is due, it could prove a hair-puller.

The blatant commercialism shows up less with basic searches on narrow topics.

Editors' Choice

PC MAGAZINE EDITORS' CHOICE

Tons of information can be found on the Web. These are the best tools to help you find what you are looking for.

• Directory search: Yahoo!

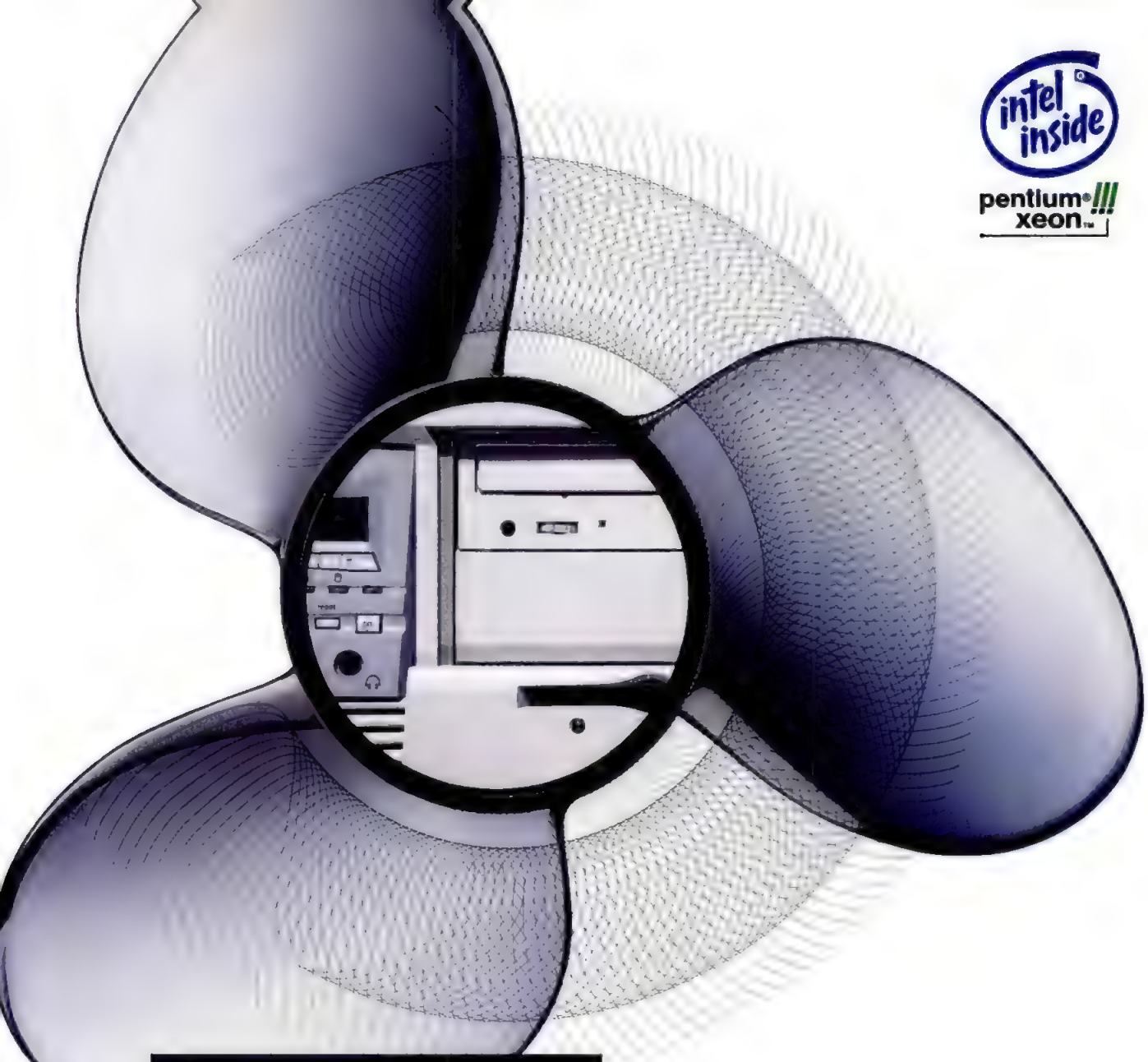
Famous for its directory—and deservedly so—Yahoo! lets you easily find what you're looking for because of its excellent categorization and organization. Yahoo!'s directory is also one of the few that you can browse or search with the same high-quality results.

• Research: Northern Light

Shining brighter with each passing year, Northern Light almost has an unfair advantage over the rest because it's the best for searching the Web, and it includes full-text databases of material not available online. Some of that content will cost you a couple of bucks, but that's sweet icing on an already rich cake.

• All-purpose search: HotBot

Here is the site that best brings together the part of you that just wants the one most relevant answer and the side of you that has an insatiable thirst for knowledge on a topic. HotBot hits the spot no matter what your mood is. You can count on getting relevant returns because of its easy and powerful search features and its effective blending of Web, popularity, and directory results.



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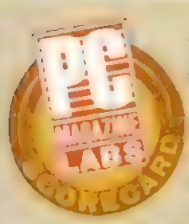

To test Web search sites, we devised more than 50 queries spanning a variety of subjects and of varying style, from single words to natural-language questions.

We initially tried all of our queries using the default settings for each site. We then examined the first ten hits, evaluating each page's relevance and recording the number of duplicate and dead links. Our ratings reflect both the number of hits that technically matched the query and the quality of the information returned. We also tested the tools that each site offered to customize a query and improve the overall quality of our return set.

We rechecked any *dead* links (defined as genuine HTML 404 errors and not temporary glitches that prevented access to the pages) over the course of the month of our testing before delivering our final rating in that category.

Many search engines today try to anticipate the exact nature of your query, returning stock data when you search for a company, for example, in addition to the sites that its search engine itself has catalogued. We evaluated the usefulness of these efforts to determine how well you can rely on these to improve your search experience.

	Relevant hits from initial query	Customizes query effectively	Eliminates duplicate links	Eliminates dead links	Effective anticipatory results
About.com	Good	Good	Fair	Fair	Fair
AltaVista	Fair	Good	Fair	Good	Fair
Ask Jeeves	Fair	Fair	Good	Good	Good
Excite	Good	Good	Good	Fair	Good
FAST Search	Good	Good	Fair	Fair	Fair
GO Network	Good	Good	Fair	Fair	Good
Google	Excellent	Fair	Good	Fair	Fair
GoTo.com	Fair	Fair	Good	Good	Good
EDITORS' CHOICE HotBot	Excellent	Good	Good	Good	Good
Looksmart	Good	Fair	Fair	Fair	Fair
Lycos	Good	Good	Fair	Fair	Fair
EDITORS' CHOICE Northern Light	Good	Excellent	Good	Fair	Excellent
Snap.com	Good	Good	Fair	Good	Good
WebCrawler	Fair	Fair	Good	Good	Fair
EDITORS' CHOICE Yahoo!	Excellent	Good	Good	Good	Good

A search on *computer architecture* yields two or three paid placements, far fewer than a search on just *computer* (several pages' worth).

Hidden beneath GoTo's simple-looking hood purrs engine technology from Inktomi, the same folks who supply plumbing for HotBot and Yahoo! Our commercial-free search results were comparable to what we got from others in the Inktomi stable, including Yahoo!—*AP*

HotBot

www.hotbot.com

With its large index and advanced search options, HotBot has always been a good choice for detailed queries. HotBot's integration of a directory and a popularity engine now lets you rely on it for general searches as well, making it the best all-purpose search site on the Web.

No other site offers the arsenal of query-building features to tailor your returns that HotBot has. It supports a full complement of Boolean commands, case-sensitive searching, and wild cards, as well as unique filtering options to find only pages that have, say, RealAudio. HotBot can also cluster results from the same site and can specify the page depth of your results, letting you retrieve only top-level pages.

On relatively common keyword searches, such as *cars*, HotBot's top ten hits are the most popular sites for your search (provided by DirectHit), and your fellow Web surfers don't generally steer you wrong. HotBot has also integrated directory matches into its returns (from the Open Directory Project), though we'd like to see it also return news headlines and stock quotes when relevant. —*NS*

Looksmart

www.looksmart.com

● For a site that purports to be easy to use, Looksmart presents a bewildering hodgepodge of results that the casual visitor may not find worth deciphering. Although clearly patterned after Yahoo!, Looksmart offers only the most rudimentary search functions and does not really compare.

You can either browse the Looksmart directory or perform keyword searches. Browsing, you won't find any standardized subject classification, making placement choices seem arbitrary at times (it didn't occur to us to look for *Linux* under *computer science*, for example).

Even though where to look is not always clear, browsing Looksmart is better than searching it. Although all you do is enter search terms and click, the search results can be very confusing. First you get matching categories, followed by a list of links within Looksmart, and then AltaVista search results. None of this is very clear unless your search has not returned many category and Looksmart page matches, in which case it's all on the same page.—*Breck Witte*

Lycos

www.lycos.com

● Granddaddy search engine Lycos has accumulated a vast estate of functions in its four years, and today it epitomizes the busy Web supersite. Wade through the come-ons for free e-mail and you-centric pages and you'll find a capable though not earth-shattering search engine.

Lycos, billed as Your Personal Internet Guide, lets you perform simple searches easily by typing in the window and clicking on Go Get It. But like a four-cylinder family wagon, this engine for simple searches is less than inspiring. Searches need a lot of coaxing with concept-narrowing keywords before they pull the most relevant results to the top of the list. And Lycos doesn't boast as extensive a database as other sites, such as AltaVista and Northern Light.

When we searched on *Russian plane rides*—the outfits that let you take a spin in Russia's finest defense jets—we got no relevant hits in Lycos's top ten.

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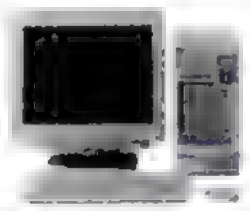

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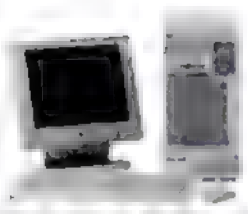

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(AltaVista produced two bull's-eyes and eight close guesses.) The more specific *MiG rides*, however, produced three good hits on Lycos.

If you're looking for something obscure, you'll be better off twiddling with the advanced-search screen or upgrading to a more powerful engine. Lycos provides a link to HotBot, a Lycos-owned search engine that performs considerably better than its parent.—*AP*

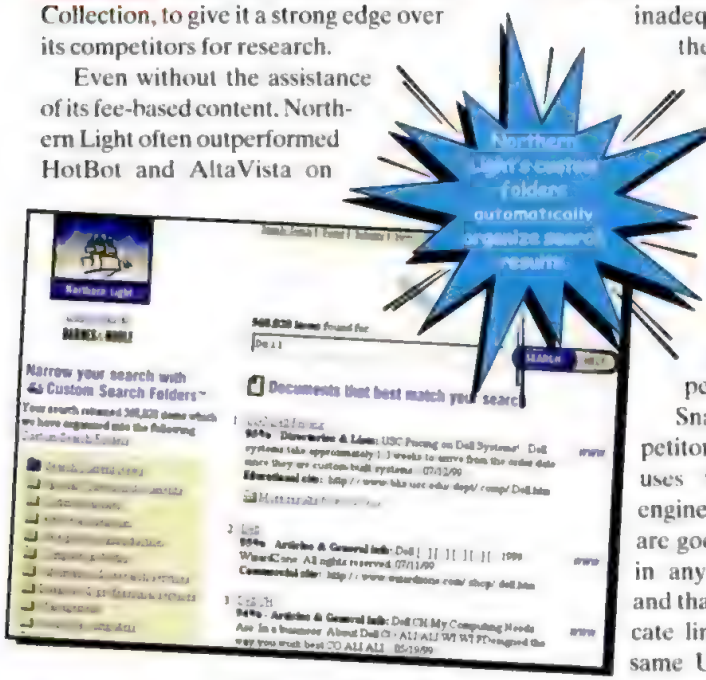
Northern Light

www.northernlight.com

PC MAGAZINE EDITORS' CHOICE

Part Internet search engine, part full-text database service, Northern Light has powerful search capabilities and an innovative way of sorting results, combined with its fee-based Special Collection, to give it a strong edge over its competitors for research.

Even without the assistance of its fee-based content, Northern Light often outperformed HotBot and AltaVista on very specific queries, thanks in part to the unique way it presents results. Northern Light dynamically sorts hits into custom folders based on source, subject, document type, and language, letting you quickly scan your returns and pick out what you find relevant. For more general searches, though, you may have better luck with Google or Yahoo!



We also like the way Northern Light lets you easily forward your query to its free Current News Search—an example that HotBot and AltaVista have yet to follow. Northern Light's extensive Special Collection contains the full text of over 5,400 journals, magazines, news wires, and other sources. Most documents cost $1 to $4, with a few higher-end sources costing more.—*NS*

Snap.com

www.snap.com

● On Yahoo!-inspired browse-and-search sites, searching often takes a backseat to browsing. Not so with Snap.com; searching is well implemented, well documented, and well integrated into the site.

Browsing through Snap's categories is generally more effective for broad, topical searches or if you're not quite sure what you're looking for. For highly focussed queries such as "What are Peru's top exports?", Snap's search interface boasts power, precision, and ease of use.

In case simple keyword searching is inadequate for your needs, there is a menu-driven Boolean Power Search feature that intuitively allows very complex searches to be generated and refined. A drop-down menu lets you search for a word, a phrase, or a person.

Snap, which like competitors Yahoo! and HotBot uses the Inktomi search engine, returns results that are good but not prioritized in any discernable fashion and that contain many duplicate links (in one case, the same URL was listed eight times in a row!).—*BW*

WebCrawler

www.webcrawler.com

● One of the first megasearch engines, WebCrawler may have already seen its best days. It's not more sophisticated or more powerful—at least as far as its results show. And just as a computer cranks garbage out if garbage is entered, WebCrawler's search results are only as good as the search words provided.

Sure, that's how all such sites are supposed to function, but WebCrawler holds

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the searcher to literal meanings more than others do, and it's not good at anticipating what the searcher wants. Part of Excite's network, WebCrawler doesn't always deliver even when it has good search words.

The name *e-Mortgage*, for example, was an easy match among 133,790 sites found. But it wasn't a problem for Yahoo! or GO Network, either. Other specific terms meant trouble for WebCrawler. A search for the *Rural Abandoned Mine Program* turned up nothing, even after we customized the search and used Boolean operators. The other search sites found the program immediately, with no customization.

WebCrawler seems to recognize its role. Posted at the bottom of the Web site is the statement, "For more comprehensive results, try Excite Search."—*MC*

Yahoo!

www.yahoo.com

PC MAGAZINE EDITORS' CHOICE

Internet standard-bearer, content provider, and Editors' Choice for portals, too: Yahoo! is all of those, but is it an effective search site?

Yahoo! is a great place to search, because it has the most comprehensive and well-organized directory. Search results are presented first through sites and categories it has already organized. Web pages are left on their own, after the organized content. But chances are you won't need the page results because the directory hits are so good.

Yahoo! doesn't function as a pure search site, but that's not a problem. You just have to know how to work the content: A search for *digital cameras*, for example, gave us 4 category matches and 16 Yahoo! site matches. Those results pointed us to Web sites that provided reviews and customer feedback about the cameras, as well as sites where we could buy a camera. The Web page matches from Inktomi's search engine were not nearly as well organized or relevant as the categories and directory sites.

Yahoo! links Web sites beneath layers of content the way a mall directory groups stores by what they sell. So consider Yahoo! a mall of information. The link-and-lead method can help both Internet neophytes and old hands browse and discover what the Web has to offer.—*MC* PC

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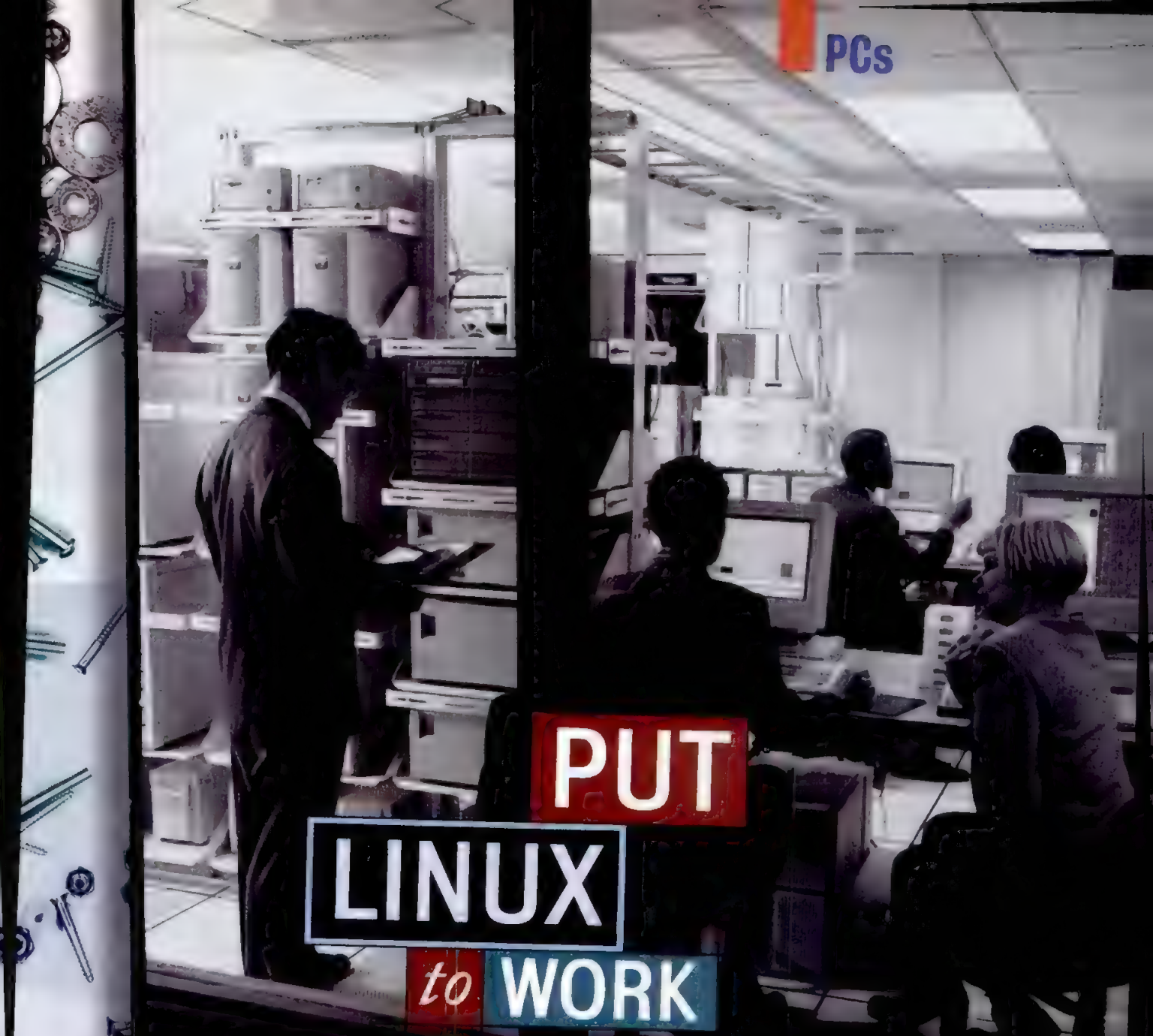

PUT LINUX to WORK

The upstart NOS deserves a place in your server room.

By Winn L. Rosch

You've probably been following the buzz surrounding Linux, the free (or nearly free) network operating system that has expanded into the business world. According to its advocates, Linux can bring both savings and increased reliability to your server room and take over a range of tasks from more costly OSs, such as Microsoft Windows NT, Novell's NetWare, and the popular Unix variants, such as AIX, SCO, and Solaris.

But does Linux actually deliver enough to make it worth the potential investment in retraining? To find out, PC Magazine Labs set up a host of services from scratch using Linux and its associated utilities. We also examined the latest Intel-based hardware solutions from leading vendors to determine what kind of service and support you can expect to find.

Our conclusion: Linux is a good solution for a range of server needs. It should cer-

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tainly be on the radar screens of most medium- and large-business IS professionals—should probably be on their road maps as well. Linux works especially well as a platform for Internet-standard services, such as DNS, HTTP, FTP, and e-mail, where its low cost, open-source utilities, and relative ease of deployment are big draws. It also works well as a development platform for those who want to deploy a customized vertical application. You might want to think twice, however, with applications that demand the best performance or the best reliability; Linux offers no clustering support and has immature SMP support and limited file-system support and RAID functionality.

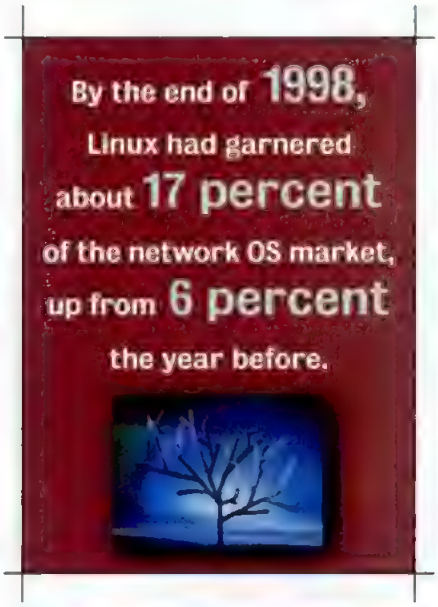
Also note that for the near term at least, Linux is mostly restricted to server applications. Software developers, engineers, and designers have found it a good foundation for workstations as well, but true desktop-productivity applications are scarce. (One exception is Corel WordPerfect 8 for Linux, which is currently available as a free download from *www.corel.com* or for $69.95 as a CD with documentation; the complete WordPerfect Office suite for Linux is due in early 2000.)

THE LINUX ALLURE

The big difference between Linux and a proprietary network operating system is that Linux is *open-source,* which means that the source code that makes it up can be seen, used, modified, or augmented by anyone. You can download the code in pieces free from the Internet or buy a package of the operating system, tools, shells, and utilities (in Linux lingo, a *distribution*) for about $50 to $80 from industry leaders such as Red Hat (*www.redhat.com*), Caldera (*www.caldera.com*), and SuSE (*www.suse.de/e/*).

You pay no licensing fee—even if you use Linux to serve a thousand users. Compare that with a Windows NT Server license—$1,999 for 5 clients, $3,999 for 25 clients—and you'll see it's little wonder an entire community has sprung up to support Linux. The IS departments of major corporations are beginning to test, use, and embrace it as a complement (or even alternative) to NetWare, Windows NT, or one of the Unix variants.

In fact, commercial sales of Linux distributions increased by nearly 200 percent from 1997 to 1998, and by the end of 1998 the operating system had garnered about 17 percent of the network OS market, according to market researcher International Data Corp. of Framingham, Massachusetts (*www.idc.com*). Although last year's growth was anomalous because of the small installed base and the industry's "discovering" Linux,



IDC projects that commercial sales of Linux will increase at a 25 percent compound rate through 2003.

Is the buzz deserved? More to the point, can you save thousands of dollars by running Linux in your server room? The superficial answer is yes. By paring licensing fees, you can save thousands of dollars with Linux. Of course, licensing and hardware represent a small fraction of the total cost of ownership. Add in training, service, and support and the equation grows more complex.

If your IS personnel have had experience with one of the flavors of Unix, then Linux will not present a training challenge, because the two look and work the same. Written nine years ago by Linus Torvalds, Linux was Torvalds's attempt to get a Unix-like operating system that would run on his Intel 386–based PC. Though resembling Unix, Linux is not a Unix variant: Torvalds wrote his code kernel from scratch to emulate Unix, not duplicate it. Still, nearly all popular Unix tools and shells have been ported to Linux. So if you know one, you will be instantly familiar with the other.

Even if your IS team is new to Linux and Unix, Linux is still worth considering. The amount of free support for Linux is staggering: Nearly every part of Linux and its add-ons—shells, editors, interfaces—has a Web site devoted to it. Moreover, the manufacturers of the PCs examined here have adopted wide-ranging support strategies. Red Hat, the leading Linux distributor in the U.S., has been actively forming alliances with the major hardware vendors (including Compaq and Hewlett-Packard). Compaq, HP, IBM, and others are also developing their own support and training to rival those offered by Linux specialists such as Penguin and VA Linux. So a reasonably adept administrator should be able to roll out Linux successfully, at least for targeted applications, with the help of a system integrator or VAR.

WHERE LINUX WORKS

So where, specifically, might Linux work for you? Our testing has revealed several instances where Linux is a viable solution.

Application servers. This area might hold the greatest potential savings for Linux users. If you are developing an in-house or industry-wide vertical application in Java or in a DBMS, you can choose from Computer Associates, Informix, Oracle, and Sybase for databases; Netscape for messaging; Novell for directory services; and Citrix for a thin client for Linux. If you really want to keep margins down, you'll find compilers for C/C++, GNU, GNU Fortran, Pascal, and

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Our Contributors: WINN L. ROSCH is a contributing editor of *PC Magazine,* and CADE METZ is a senior writer. RUSS IWANCHUK was the project leader, and senior associate editor JAMIE M. BSALES was in charge of this story.

Perl available at no additional cost. You can deploy application servers throughout an enterprise or an industry—all free of OS licensing costs. Linux might not have all of the high-reliability bells and whistles, but as our product reviews show, you can configure a very nice turnkey Linux server system for customized applications.

Web servers. More Web sites run on Linux than on any other OS, and the software (Apache) is proven and widely available. Apache is one of the easiest services to get going on Linux, and it doesn't require much tweaking for basic functionality. Most Linux-powered Web servers handle smaller sites—most notably corporate intranets—because Linux doesn't have all of the high-availability mechanisms, such as a journaling system, clustering, and CPU fail-over mechanisms, that a larger Web site requires. Web sites demanding extreme reliability and security are better off with outsourced Web-hosting services.

DNS servers. DNS (Domain Name Service) resolves names (such as *www.pcmag.com*) into proper IP addresses, and PC Magazine Labs found that Linux works well here. Typically, you set it up and then forget it. If you've set up DNS before, setting it up with Linux is simple. If you haven't set up DNS before, there's a lot of trial and error (as there is with any NOS). The GUI and online help are beneficial, but expect to have to do your research. Still, while we found the Linux installation was different from that of Windows NT Server, it wasn't more difficult or complex.

Web proxies. A proxy server protects an internal LAN by showing one impenetrable IP address to the Internet. It can also cache often-used Web pages, so the page request never leaves the proxy server. Squid is the most popular utility for a Linux Web proxy and for caching. We had it up and running within an hour (including Linux installation and file-system management) thanks to a straightforward installation and helpful online documentation.

FTP servers. Setting up an FTP server with Linux is a no-brainer. It installs with the operating system by default and just works, plain and simple.

Remote administration. Once these

HANDS ON with LINUX

Fine-tune your Linux server for maximum utility. Here's what PC Magazine Labs technicians found.

GENERAL

The Linuxconf utility provides a useful front end for setting up and configuring most of these services. Note that the software packages and how-to documentation that come with the Linux distribution are not always current; the most recent versions are usually downloadable from the Web.

WEB SERVER

Apache (*www.apache.org*) lets you easily add Web service to a Linux box. Apache is one of the easiest services to get going on Linux, and there isn't much tweaking to be done for basic functionality.

▶ **TIP** For high-volume Web servers, Apache has many tunable parameters. Check Apache's Web site for detailed advice on performance tuning.

WEB PROXY

Squid (*squid.nlanr.net*) can be used for Web proxy and caching. You can get a default instance of Squid up and running within an hour, including Linux installation and file system management The installation is straightforward and fairly simple, with helpful documentation available online.

▶ **TIP** The help guide suggests that you set up Squid with a user other than the root to avoid creating security loopholes. If you decide to do this, be consistent and perform all updates, tweaks, and house cleaning as that user, since permissions can get tricky if you do some work as root and some as another user.

FTP SERVICE

You can add the FTP service during initial setup of your Linux box or as an upgrade. It's as simple as checking the service during installation. The service adds an FTP user to your password file and creates an FTP directory at /home/ftp, which includes a /pub directory with security access set for anonymous downloads.

▶ **TIP** If you only occasionally share files, FTP is easier to set up and maintain than Samba.

E-MAIL SERVER

Though Linux comes with the Sendmail mail-transfer agent, we found qmail (*www.qmail.org*) easier to configure and operate. It still won't be as easy to install as most Windows-based e-mail products, but qmail is free, and it claims high security and reliability.

▶ **TIP** Expect to read a lot—both qmail's many installation files and the fine user-contributed documentation available at the qmail site.

FILE SHARING

Samba (*www.samba.org*) is the Linux-based SMB (Windows networking) client and server. To add the service from the Red Hat CD to your existing Linux configuration, use your boot disk and perform an upgrade (instead of an installation). Samba is found in the System Environment/Daemons additions. We found it a bit difficult to set up, but powerful. In addition to providing SMB file and print services, Samba can act as the Master Browser or Primary Domain Controller (PDC) for your network.

▶ **TIP** We found that using an existing PDC for user-authentication simplified the task of Windows network integration.

REMOTE ACCESS

Using telnet, a utility included with commercial Linux distributions, we were able to connect remotely to the Linux server from Windows 98 and NT clients quite easily. In all instances, we connected easily as any user on the Linux station except root.

▶ **TIP** Note that root access is not permitted through telnet, to avoid security risk.

PERFORMANCE TESTS

Linux Servers

The focus of this story is Linux and its relative worth as a server operating system. To that end, we ran ZD WebBench 3.0 under Red Hat Linux (the version submitted by each hardware vendor in this roundup) and Microsoft Windows NT Server on the same server hardware, the HP NetServer E60, to measure how fast each Web server would serve up static Web pages of varying sizes.

Since our sister publication *PC Week* did an extensive job testing Linux, NetWare, Solaris, and Windows NT Server on higher-end servers in their May 10 and June 25 issues, we decided to test a lower-end configuration. Thus, while we upgraded the operating systems and its respective Web servers (Apache and Internet Information Server) to the latest versions, we did not attempt to tune them for our benchmark test. We found surprising differences comparing results of *PC Week*'s WebBench tests (run on a test-bed of higher-end hardware and well-tuned operating systems) with those of our test run on a lower-end untuned test-bed. Linux's peak Web performance was 58 percent better than Windows NT's.

A WebBench run starts with one client requesting information from the Web server, then four, then eight—the number of requests increasing by four until the end of the test. In earlier test runs, throughput is bottlenecked by clients, but as clients are added, they consume the Web server's resources, and the throughput lines flatten out. Windows NT Server fared better than Linux until the 12-client run, where Windows NT's score continued leveling out toward around 600 requests per second, while Linux's shot up to its peak of around 945.

Our results were the opposite of what we'd expected to see, given *PC Week*'s test results. Ideally, all of WebBench's static content (around 60MB) becomes cached during the test run. In Windows NT's case, however, we found that the operating system had to access the disk during its test run much more often than Linux did, thus slowing its performance. The fact that the HP system didn't use a speedy disk array probably magnified any performance issues originating with the disk subsystem. Also, we initially thought that the server's 128MB of memory wasn't enough to cache the workload in addition to maintaining room for the operating system itself; but we saw that when we tuned IIS through a couple of published registry tweaks to use its memory cache better, WebBench results improved dramatically.
—Analysis written by Russ Iwanchuk

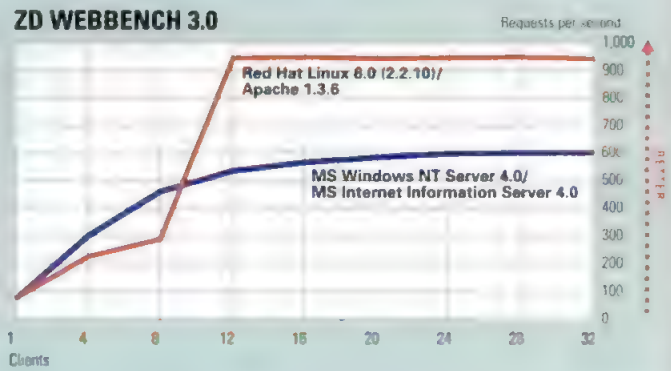
How We Tested

We ran WebBench 3.0's static test on the HP NetServer E60 (with a 550-MHz Pentium III CPU, 512K of L2 cache, 128MB of SDRAM, two 7,200-rpm Ultra/Wide SCSI hard disks, and four Intel EtherExpress PRO/100 NICs) running Linux and Windows NT Server. For Linux, we started with Red Hat 6.0, but to avoid well-known TCP issues that prevent proper WebBench runs, we upgraded from the 2.2.5 kernel to 2.2.10. We used the Apache 1.3.6 Web server in its default configuration, except that we turned off access logging. We conducted our Windows NT test with Windows NT Server 4, Service Pack 4, and IIS 4.0; as with Apache, we turned off the server's access logging.

For our hands-on testing (see the sidebar "Hands On with Linux"), we set up the various Linux services on Dell OptiPlex GX1s (400-MHz Pentium II CPU and 128MB of RAM) running Red Hat 6.0. We tested the services with various Windows 98 and NT installations, and also on Dell GX1 computers.

▼ In an untuned environment, Linux performance surpassed Windows NT Server performance on ZD WebBench 3.0 with 12 clients or more accessing the system. Windows performance flattened out at about 600 requests per second, while Linux performance leveled off at 945 requests per second. Note, however, that these results were untuned: A savvy Windows NT administrator could make some simple tweaks to bring that OS's performance in line with a comparable Linux server.

ZD WEBBENCH 3.0



services are running, any remote administration or maintenance can be done via a telnet command-line session to the Linux system.

NOT ITS STRONG SUIT

Although you can certainly run your entire server room on Linux (and many companies do), there are primary services that work better with NetWare or Windows NT—especially if you already have a commitment of resources and training with one of those OSs.

E-mail servers. Linux includes the mail-transfer agent Sendmail, used in most of the world's e-mail servers. Sendmail is quite an undertaking to troubleshoot and configure properly, especially for a novice. Easier than Sendmail is qmail (distributed free), but most Windows-based e-mail servers are even easier to configure correctly—and if you want the extra functionality of groupware products, you'll have to wait for Lotus Domino for Linux.

File servers. Truth be told, Linux file service just isn't as easy or as comfortable to use as either NetWare or Windows file service, so Linux is less than ideal for this application. For file service, Linux encompasses Microsoft's SMB and Unix's NFS. We found, however, that configuration of the clients and the server modules is problematic; you really have to know what you're doing. Also, in tests conducted by our sister publica-

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tion *PC Week*, Linux didn't show file server performance comparable to Windows NT. Linux lacks the elevator-seeking, caching, prefetch, and other techniques found in NetWare or Windows.

Network administrators used to Linux's competitors will notice other shortcomings that they might not want to deal with. For example, during our installation, even the most popular distribution (Red Hat Linux) was far less forgiving than Windows NT during setup. With all the options available for installation in a custom setup, it's possible to inadvertently fall out of one of the installation scripts and have to start over.

Driver availability is another hurdle. Though more and more hardware vendors are supplying Linux-compatible drivers, finding a driver for a particular component can be challenging—if not impossible. Again, this is a good reason to buy one of the turnkey integrated systems in our roundup: The system vendor or VAR will have ironed out any compatibility issues.

But perhaps the biggest hurdle to overcome before deploying Linux is training. The Linux management tools are not as refined as those of commercial operating systems (many still require editing of configuration files), so administrators will need intimate knowledge of the operating system or of the closely related Unix. Administrators should also be aware that getting Linux to run may require tuning the system (getting it to run optimally certainly will), so you will need access to that expertise. Still, we found that learning Linux is no more daunting a task than learning any other NOS.

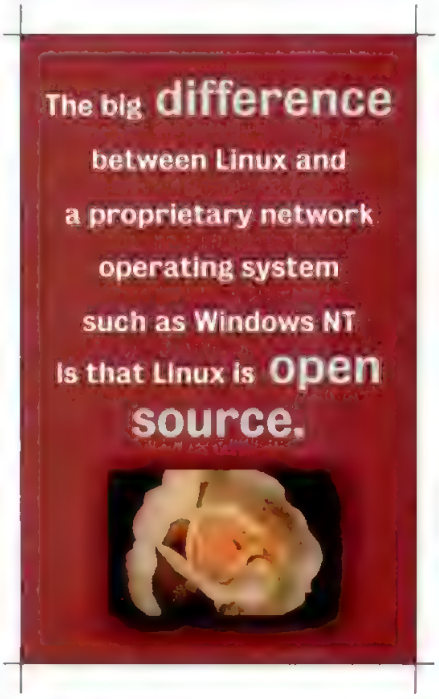
PERFORMANCE AND HARDWARE

Moreover, as networks get larger, Windows NT and NetWare have their advantages. For example, Linux is notably weak in scalability. In scalability tests conducted by *PC Week*, Linux Web server performance wasn't as good as others, and its SMB file sharing wasn't particularly fast either. Also, Windows NT showed more processor scalability in Web performance (see our performance tests results for details).

We can conclude from both *PC Week*'s results and our own that Linux and Windows NT Server are both more than capable of hosting a Web server adequate for most bandwidth requirements. On our tests, lower-end server hardware tested better with untuned Linux than with untuned Windows NT Server, but a savvy network administrator can track down some easily implemented tuning information for either network operating system-Web server combination.

Linux suffers in transaction processing as well, because of the design of its kernel: It must switch modes more often than Windows NT, which adds delays. In fact, performance is the most controversial issue when comparing Linux with Windows NT. The myth perpetuated by Linux advocates is that Linux is lean, mean, and faster than the fat commercial operating systems. No test to date—including our own—has confirmed Linux's supposedly overwhelming edge. Compare its performance with Windows NT on a modern server and you'll find no clear winner. Windows NT wins in some situations, Linux in others.

Claims that you don't need as much processor horsepower for Linux—and thus can press aging hardware into service—stem from Linux's ability to run on any Intel processor–based system. Such claims must be taken with a grain of salt, however. Certainly, Linux will run on a 386 because it was *created* for the 386, but it runs slowly on slow platforms. You can get away with using Linux on a slow system for minimal applications (such as



print serving), because you don't need to run the excess baggage of a graphical user interface—optional in Linux but not Windows. But for any file or Web server (where interface needs are trivial), Linux and Windows NT will turn in roughly comparable performance.

Moreover, the resource needs for Linux (the popular Red Hat 6.0 distribution requires 125MB of disk space for the operating system) are not significantly different from the demands of Windows NT or NetWare. You can get away with

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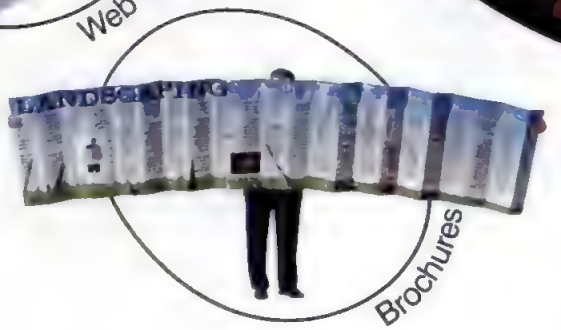

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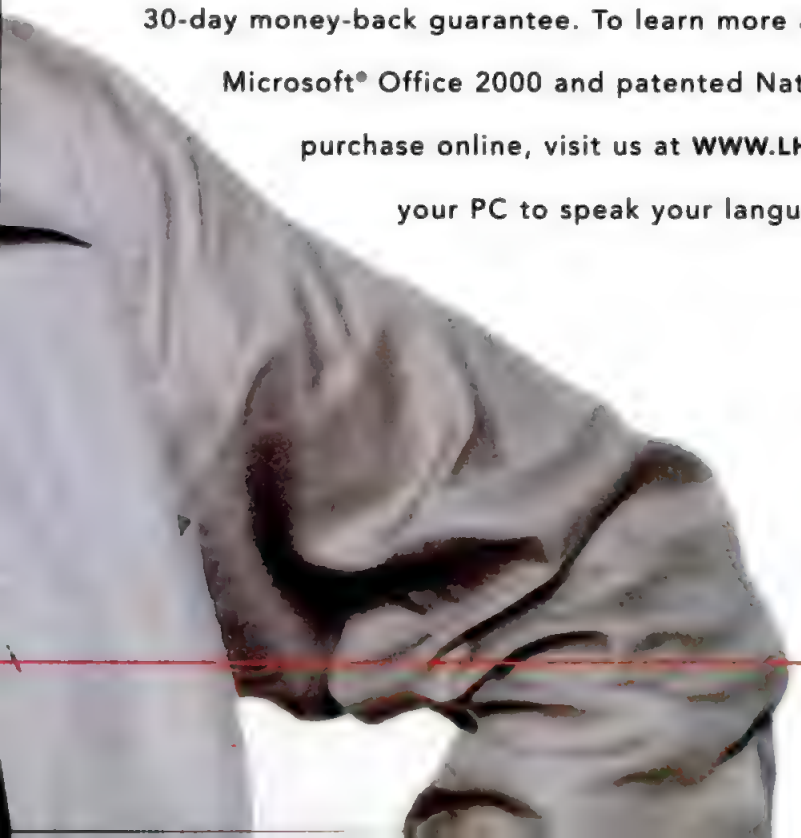

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SUMMARY OF FEATURES

Linux Servers

	Compaq ProLiant 1850R	HP NetServer E 60	Penguin 700 Tower	Toshiba Magnia 5010	VA VArStation StartX MP
Price of tested configuration	$6,176	$3,210	$7,064	$6,870	$4,077
Processor	Pentium III/550	Pentium III/550	Pentium III/550	Pentium III/550	2 Pentium III/550s
Installed SDRAM/ Maximum memory	128MB / 1GB	128MB / 1GB	128MB / 1GB	128MB / 1GB	128MB / 1GB
Network interface card	Compaq 10/100 Base-TX	HP 10/100 Base-TX	Intel 10/100 Ethernet	Integrated 10/100 Ethernet	Intel 10/100 Ethernet
Linux version included	Red Hat 6.0	Red Hat 6.0	Red Hat 6.0	Red Hat 6.0	Red Hat 6.0
Operating system hard disk	Compaq 9GB	HP 9GB	IBM 9GB	IBM 9GB	Atlas IV 9GB
Data hard disk	Compaq 9GB	HP 9GB	IBM 9GB	IBM 9GB	Atlas IV 9GB
Type of memory slots/ number in use/total	DIMM / 1 / 4	DIMM / 1 / 4	DIMM / 1 / 4	DIMM / 1 / 4	DIMM / 4 / 4
Expansion bus slots	3 PCI, 1 shared	5 PCI, 1 shared	1 ISA, 5 PCI, 1 shared	1 ISA, 5 PCI, 1 shared	5 PCI, 1 shared
Front-accessible bays in chassis 5.25" / 3.5"	1 / 2	2 / 1	6 / 1	3 / 1	3 / 2
Internal bays in chassis 5.25" / 3.5"	1 / 2	0 / 4	1 / 0	0 / 0	0 / 0
Front-accessible disk drive bays 1.0" / 1.6"	4 / 0	0 / 0	0 / 6	6 / 0	2 / 3
Power-supply wattage	225W	256W	300W	500W	300W
Lockable hard-disk subsystem/ power supply	■■	□□	■■	■■	□□
Suspend button/Reset button	■■	□□	■■	■■	□■
Fans/Power supplies	1 / 2	2 / 1	7 / 2	5 / 2	5 / 1
Management software	Compaq Insight Manager	Auto Alert HP Top Tools	GDT monitor RAID control under Linux	None	Standard Linux utilities
Remote reboot	■	□	■	■	□
Graphics card	ATI Rage IIc	ATI Rage IIc AGP	ATI Rage IIc	Cirrus Logic CL-GD5480 PCI	Matrox G200
CD-ROM drive speed	24X	32X	40X	32X	40X
Bootable CD-ROM drive	■	■	■	■	■
24-hour, 7-day technical support	■	■	■	■	Optional
Prefailure warranty coverage	■	■	□	■	□
Warranty on parts/labor	3 years / 3 years	1 year / 1 year	2 years / 2 years	3 years / 3 years	1 year / 1 year
Next-day on-site service included	■	■	□	■	□
Standard on-site service response time	Second business day	Next business day	1–2 hours	Next business day	Varies

less hard disk space for a Linux server, because there are fewer worries about bulky applications eating up a lot of space.

GO THE READY-MADE ROUTE

Certified and preconfigured systems promise to eliminate the worst of the bugaboos in getting Linux to work—namely installation, driver support, and system tuning. The hardware vendor (or a value-added reseller) takes care of the biggest headaches, letting you take full advantage of Linux as easily as you would Windows NT.

So for our reviews, we invited the largest Intel-based server vendors to participate with their Linux offerings; Compaq, HP, and Toshiba accepted our invitation, and Dell and IBM declined. We also invited two manufacturers dedicated to developing Linux systems exclusively: Penguin and VA LiNux Systems. We asked each of the five to submit a typical Web or departmental server powered by a 550-MHz Pentium III (and capable of dual processing) with 128MB of RAM (expandable to at least 1GB), two 9GB SCSI hard disks, 10/100 Base-T Ethernet adapters, and Linux installed. Although we did not specify which distribution of Linux to include, all of these systems came with Red Hat. VA LiNux Systems added its own enhancements to the Red Hat package.

Note that our goal was to see how adept each vendor was at providing and supporting a Linux server. So this roundup is not a strict apples-to-apples hardware evaluation where we could award a clear Editors' Choice—though we have strong opinions about which vendors are ahead of the Linux curve and which are a bit behind.

For example, Compaq (thanks in large part to its acquisition of Digital Equipment Corp.) and HP both offer a full range of Linux-specific support and training packages direct, but leave the responsibility of loading and configuring the OS to the reseller. Penguin and VA, by contrast, handle the loading and configuring themselves, as well as deliver support.

If you've decided that Linux might work for you, the reviews that follow should help you choose the vendor that can best match your needs.

Compaq ProLiant 1850R

Pentium III/550, 128MB RAM, two 9GB 10,000-rpm hard disks, one Fast Ethernet adapter. $6,180 street. Houston; 800-888-0220; www.compaq.com.

● You need a serious server if you plan to build your business around Linux, and the Compaq ProLiant 1850R is exactly that. Few systems in its class are sturdier or more serviceable, and Compaq offers a full complement of Linux-specific support packages to keep you running.

For our review, Compaq preinstalled Linux (Red Hat 6.0), but you'll have to arrange for a Compaq channel partner (value-added reseller) to prepare your system for you. Compaq is so new to Linux that the documentation that accompanied our ProLiant doesn't mention Linux, although it covers specifics for other popular network operating systems.

With the acquisition of Digital Equipment Corp., Compaq is now a services company: In late July, Compaq Services announced its official Linux support policy. Its offerings include telephone advisory support for individual desktop Linux users and, for IT professionals, paid-for Linux operational and remedial support starting with a ten-incident Callpack package (priced at $1,320). The services division also offers installation, start-up, a security check, and planning help for Linux systems.

You can open the case and replace all major components without tools, and thanks to clever plastic retaining clips, you can even swap the expansion board in the four PCI slots without a screwdriver (drives swap without opening the

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case). To help assure uninterrupted operation, the chassis supports up to six hot-swappable drives for RAID operation (add $800 for a RAID controller), plus redundant 220-watt power supplies (only one is standard; the second is a $340 option). The motherboard includes a Fast Ethernet controller and an Ultra Wide SCSI connection. The class-leading built-in management features of the ProLiant allow remote administration regardless of the operating system you choose, including remote console control and rebooting, automatic recovery, and hardware password protection.

The ProLiant is a formidable (and reliable) Linux platform, especially with the comprehensive support options.—*WLR*

HP NetServer E 60

Pentium III/550, 128MB RAM, two 9GB 7,200-rpm hard disks, two Fast Ethernet adapters. $3,210 street. Palo Alto, CA; 800-752-0900; www.hp.com.

● A longtime player in the RISC server market, Hewlett-Packard has taken advantage of its Unix support infrastructure. HP now offers comparable support for those running Linux on the Intel-based HP NetServers. The company relies on resellers to load the OS but handles almost everything else itself: posting Linux drivers on its Web site, organizing Linux training classes, and fully supporting popular Linux releases. Certified to run Red Hat Linux, the HP NetServer E 60 is a leading option for small offices wishing to use Linux for modest, in-house server tasks.

As part of the one-year, next-business-day, on-site warranty accompanying each NetServer, HP (or its VARs) will help users install and configure Red Hat Linux. Following this process, you can still call HP's main help line for support, but if your problem turns out to be a Linux issue, you'll be forwarded to Red Hat. HP's public Web site includes Red Hat installation help and an extensive selection of Linux drivers.

For an additional fee ($100 to $130 per month), HP will provide complete support for multiple flavors of Linux. This service option includes call-in support, remote software-based support, and access to otherwise private support documentation on the Web. In addition to its fee-based support services and the offerings on its Web site, the company gives Linux training classes at educational centers worldwide.

Fastened shut with thumbscrews, the E 60's mini-tower chassis can be easily opened and affords ample room for expansion: You can install a second CPU, up to 1GB of memory, up to 72GB of storage, and up to six PCI cards. RAID controllers ($800 to $2,000) and tape drives ($400) are also available. HP does include its Navigator configuration tool and TopTools management application, but if you choose to run Linux, the latter is useless and the former is useful only in part. Regardless of which OS you use, Navigator provides diagnostic tests, tools for configuring add-in cards, documentation, and a few other utilities, but it won't help you install any

OS other than Windows NT. Such a tool for Linux (and one for NetWare) is on its way, which will improve HP's already formidable Linux server support and make this package even more attractive. —*Cade Metz*

Penguin 700 Tower

Pentium III/550, 128MB RAM, two 9GB 10,000-rpm hard disks, Fast Ethernet adapter. $7,060 direct. San Francisco; 888-736-4846; www.penguincomputing.com.

● Founded by a former VA Linux employee, Penguin Computing was one of the first vendors to sell nothing but Linux machines. Penguin's early dedication to the market spawned some of today's leading Linux hardware offerings. The Penguin 700 Tower is the most expensive machine we tested, but it comes configured with robust hardware that costs extra from other vendors (RAID, redundant power supplies), and the price includes complete OS and software support.

Penguin's fondness for and dedication to Linux are well represented by a manual that ships with all Penguin servers and workstations, a 1,600-page tome titled *Linux: The Complete Reference.* Running Red Hat 6.0, the system boots to a command line by default (according to Penguin, most of its users don't want GUI overhead when running a Web server), but the company will preconfigure a GUI on request. All buyers receive a quick-start guide that explains the process of configuring Red Hat, but if you need further help tweaking the OS, installing software, or installing a new Linux kernel later on, Penguin will provide it for free. The machine's two-year warranty does not provide on-site service, but this can be purchased separately.

Our one complaint about the hardware is that the 700 Tower's chassis is a generation behind the easy-access and tool-free designs that make servicing or upgrading other servers (like the Compaq and HP units) a snap. Yet the collection of hardware housed in this tower is excellent. Redundant components abound, including dual power supplies and dual 10,000-rpm SCSI hard disks configured in a RAID Level 1 array. Uniquely, an app known as GDT Monitor lets you adjust or upgrade this array from within the OS. Many vendors force Linux users to make such adjustments within a server's BIOS. The system also offers a 20GB Travan tape drive and plenty of room for expansion, supporting a second processor, up to 1GB of memory, and up to 200GB of hard disk space.

If your organization is new to Linux and will probably need all the free OS support it can get, the Penguin bundle is worth the price.—*CM*

Toshiba Magnia 5010

Pentium III/550, 128MB DRAM, two 9GB 7,200-rpm hard disks, two Fast Ethernet adapters. $6,870 street. Irvine, CA; 800-867-4422; www.toshiba.com.

● Still relatively new to the U.S. PC server market, Toshiba has yet to embrace

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THE PLACE FOR YOUR PC

Linux to the extent that many of Toshiba's competitors have. The company's Magnia 3000–series workgroup servers and 5000-series departmental servers—a group that includes the Toshiba Magnia 5010 tested at PC Magazine Labs—are certified to run Red Hat Linux, and the company's support personnel will help should you have questions when installing the OS. But unlike with offerings from HP and Penguin, Magnia 5010 users must look to Red Hat or a local Toshiba reseller for additional Linux support.

Choosing to sell its servers exclusively through dealers and resellers, Toshiba is not responsible for loading or configuring server operating systems—and that includes Linux. Thus, if you wish to run Linux on the Magnia 5010, you must either load the OS yourself or rely on a local reseller. If you decide to load it yourself, Toshiba will help you install Red Hat Linux and will generally get your hardware up and running, but if you call the company with a Linux-related question after the initial setup process, you will be forwarded to Red Hat.

Although we had no problems running the Magnia 5010 with Linux, the company provided no compatible hardware setup or management software. Toshiba does offer a Server Setup CD for use with Windows NT 4.0, but a comparable Linux-based tool is not yet available.

The Magnia 5010's hardware is certainly robust and well suited to a reliable midrange server. Our test configuration featured hot-swappable hard disks, a redundant power supply, dual Ethernet adapters, and a cleverly designed chassis. You can order it with a RAID controller ($1,400 to $1,800), and the system supports up to 6 hot-swappable disks (up to 12 if a second cage is added). Like such disks, the system's fans, its dual hot-pluggable power supplies, and its 32X SCSI CD-ROM drive can all be conveniently removed without tools.

Offering a three-year, next-day, on-site warranty, Toshiba hardly skimps on hardware support for its servers. But lacking extended Linux service packages—and training classes—the company isn't as mindful of Linux users as are longtime Unix server vendor HP and Linux-only house such as Penguin and VA Linux Systems.—*CM*

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Left to right: Compaq AlphaServer, Compaq ProLiant, Compaq NonStop Himalaya

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VA VArStation StartX MP

Two Pentium III/550s, 128MB RAM, two 9GB 10,000-rpm hard disks, 1 Fast Ethernet adapter, $4,080 street. Sunnyvale, CA; 888-546-8948; www.valinux.com.

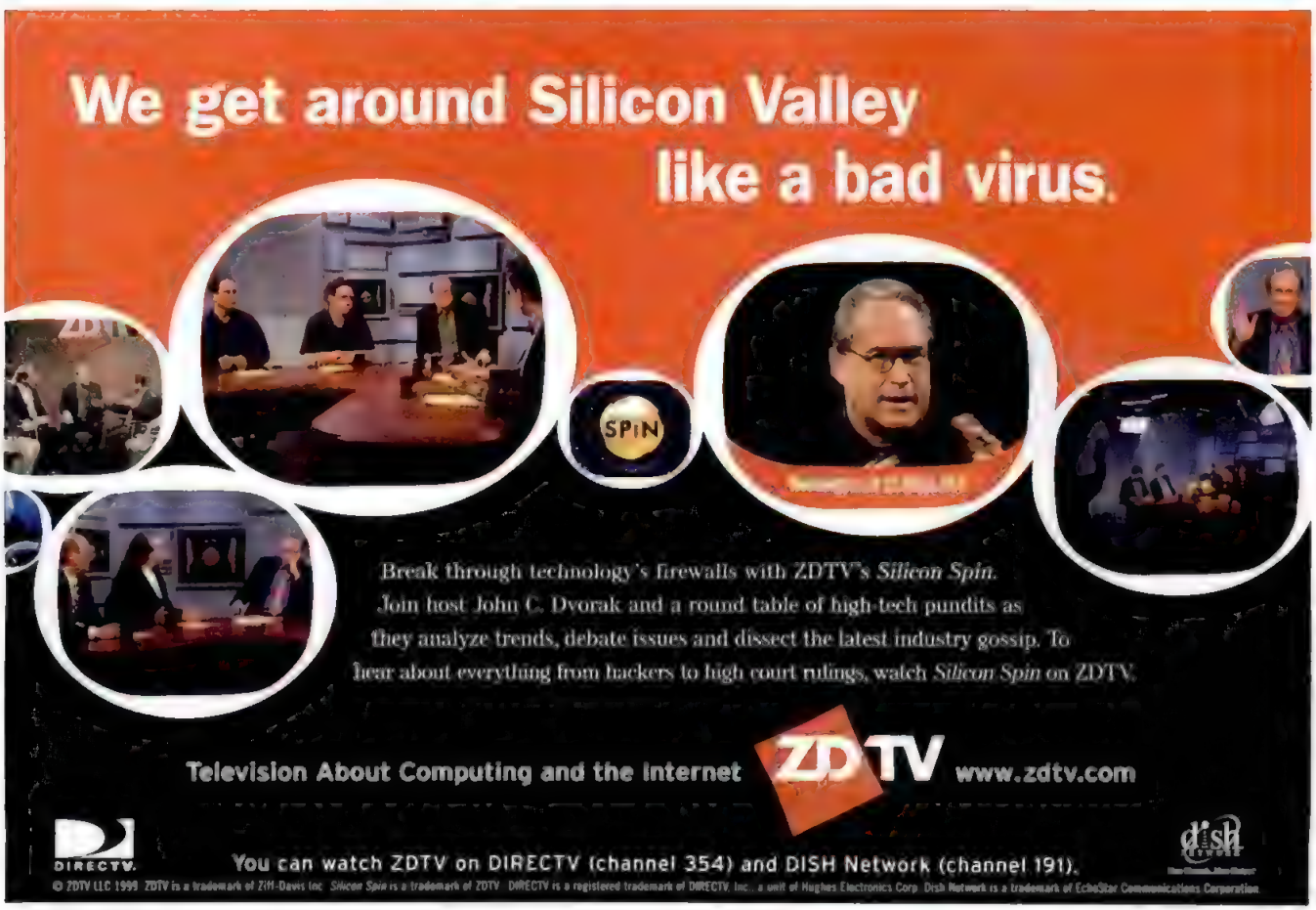
● Like Penguin Computing, VA Linux Systems offers only hardware that runs Linux. The company's value-added proposition is in its full complement of support packages—both included and fee-based. VA Linux has a bright vision of the future of Linux, believing that the operating system will quickly move from server to desktop applications. The VA VArStation StartX MP we tested reflects this confidence: It is serviceable as a server, but its multimedia capabilities (8MB of accelerated 3-D graphics from Matrox and a Creative Labs sound board) and second processor make it a candidate for workstation duty. For businesses that are new to Linux, the VA solutions are worth a look.

Because it supplies both hardware and software, VA Linux claims it will never refer you to anyone else for support. The VArStation comes with one year of installation, configuration, and administration telephone help during business hours (24-hour, 7-day support is available at $3,595 for six incidents per year). On-site hardware service (through DecisionOne Corp.) is also included. Beyond the warranty, VA sells Linux support starting with a $995 three-incident package and commercial-level support starting at $21,995.

VA ships its computers with its own Linux distribution. Although based on Red Hat 6.0, the VA implementation prefers booting you up to the KDE shell initially. Systems ship with Linux not only preinstalled but also tuned (according to VA) with the graphics and network settings customized for best performance. When we switched on the VArStation, all we had to do was key in the preset password to get Linux up and running.

VA does not include the Red Hat documentation. Instead, the company adds Que's Using Linux as a general guide. For the impatient, the system also includes a cheat sheet with a quick step-by-step guide to getting the system going. VA includes the manufacturers' driver disks and manuals for various peripherals, but no overall system guide.

Consider the VArStation price to be for more than just hardware. It also buys you a hand to hold, which makes the solution especially appealing for shops new to Linux.—*WR* PC



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*Figures assume 2.1 ALDC hardware compression. $1295 MSRP for internal kit.

THE HUB IS DEAD LONG LIVE THE SWITCH

By Frank J. Derfler, Jr.

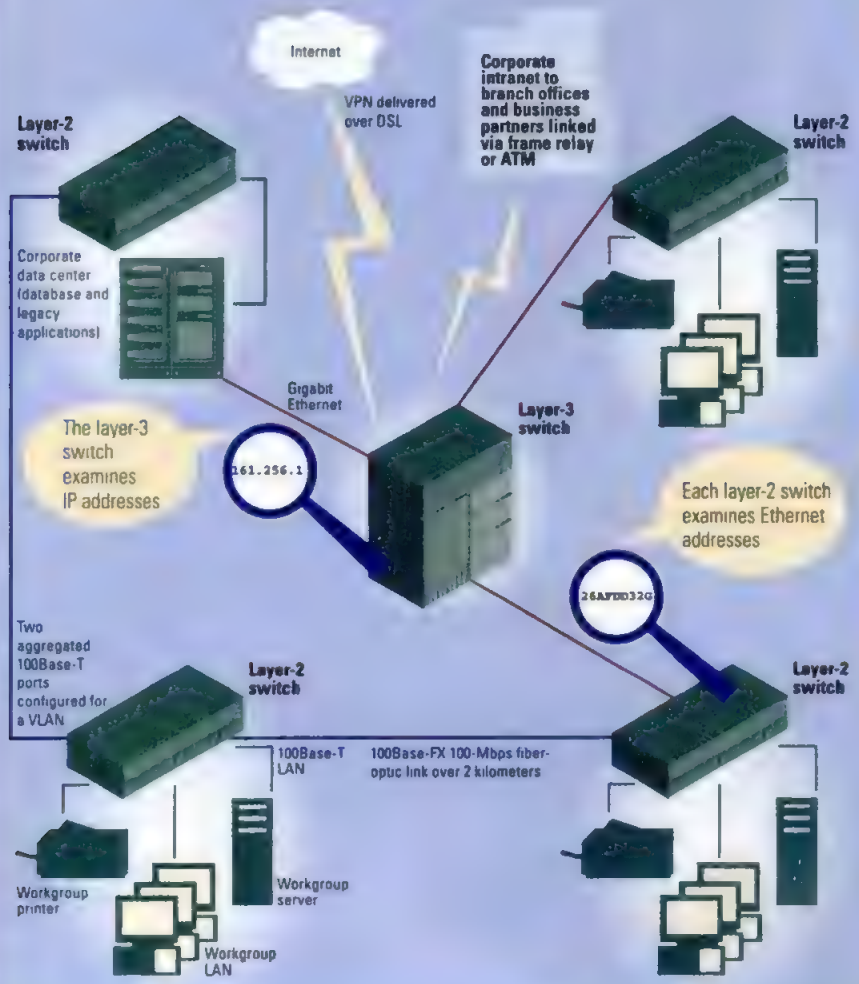
Today's 10/100 switches are so inexpensive that you shouldn't even think about buying a hub.

Stop right now! Before you buy a 10/100 Ethernet hub for your office or home network, consider an Ethernet switch instead. Switches have always offered better throughput, flexibility, and system reliability than hubs, but at a premium price. This year, 10/100 switch prices are so low—as low as $35 per port—that the benefits overwhelm the price differential with hubs. A hub might initially cost about half the price of a comparable switch (less of a difference at the high end and more at the low end), but in the long run, the flexibility and growth of the switch preclude many other personnel and resource costs. Interestingly, the companies driving down the prices—Cisco, D-Link, and HP—top our list for value in their classes, and the Cisco Catalyst 3524 XL is our Editors' Choice.

Photography by Thom O'Connor

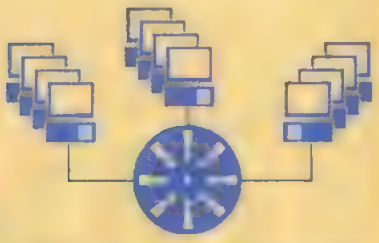
SWITCHES ON A CORPORATE NETWORK

Our diagram shows layer-2 and layer-3 switches in a corporate network. The layer-2 switches provide links between the desktop devices on each LAN. Their optional fiber-optic interface ports can link into a fast Gigabit Ethernet backbone or provide connections across a distance of over 2 kilometers to cross a campus. One switch is shown using two 100-Mbps ports combined for greater bandwidth and reliability. These ports are configured as a virtual LAN so that data flows directly to and from the corporate data center without loading the network backbone.



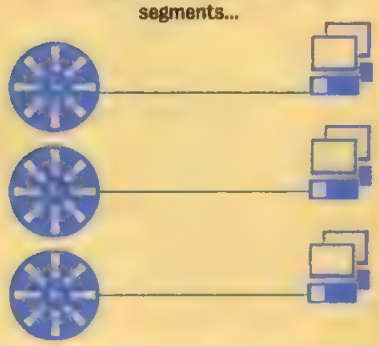
Hubs vs. Switches

You have a network consisting of 20 PCs all running off of one hub...



...and you want to add streaming video, audio, or other modern applications.

You can either add multiple hubs and reconfigure your LAN into smaller segments...



...or change to a switch-based LAN, which handles those new applications and has room for growth.

Switches move data between network nodes without contention. Each node attached to a switch has an open 10- or 100-Mbs channel. By contrast, hubs share a single channel among all ports using Ethernet's contention scheme. A hub works fine until somebody starts listening to an Internet radio broadcast or conducting a video meeting. Applications that stream data raise the contention activity in hubs. The LAN doesn't choke because of throughput limitations, it chokes because of contention for access. Adding a switch eliminates contention.

You might read headlines about layer-3 switches that route packets based on IP addresses. These switches challenge the routers commonly used in network backbones, so they're news. But they're also expensive, and their arcane benefits fit best at the junction between the LAN and WAN. The value today is in switches that switch packets using Ethernet addresses. These layer-2 switches are now practical and affordable.

REVIEW CRITERIA

We brought two groups of layer-2 10/100 switches into the PC Magazine Labs for testing. The first group was made up of managed switches from Allied Telesyn International Corp. (ATI),

Our Contributors: STEVE RIGNEY is a contributing editor of *PC Magazine*. FRANK J. DERFLER, JR., is the senior networking editor, and KEVIN YOUNG is a project leader. Executive editor LEON ERLANGER was in charge of this story.

Editors' Choice

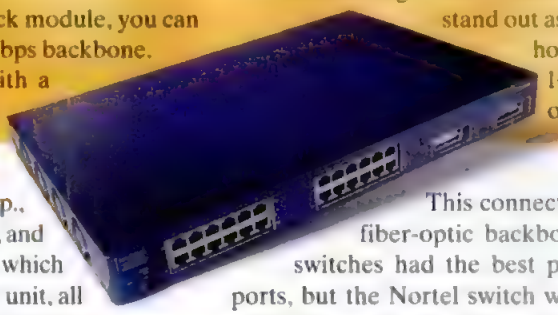
- Cisco Catalyst 3524 XL

PC Labs pushed this group of managed switches to the limit before any one distinguished itself on our benchmark tests. In the end, it comes down to scalability, management, value, and the question "Whom do you trust with your network?" You can trust the Cisco Catalyst 3524 XL ($3,495 list) to take you anywhere you want to go for a price that's the second lowest of all the managed switches we reviewed.

With the 3524 XL's optional GigaStack module, you can stack nine Cisco switches and have a 1-Gbps backbone. The 3524 XL can also be combined with a Gigabit switch, such as the Catalyst 3508 eight-port Gigabit switch, to connect eight Catalyst switches over a 5-Gbps backplane. There's also a clustering option to link 16 Catalyst switches using any port—10 Mbps, 100 Mbps, or GBIC—and manage all of them as a single IP address. Cisco, of course, also has an excellent reputation for reliability and support.

Honorable mention in the managed switches category goes to the HP ProCurve Switch 2424M, whose list price of $2,139 is $1,356 less than that of its closest competitor. With the ProCurve, you can stack up to seven switches, and the optional module can handle a GBIC, other fiber-optic connections, or even an eight-port 100-Mbps hub card. The browser management is great and offers pop-up help, and the HP TopTools SNMP manager is powerful and can monitor all SNMP devices on the network.

The unmanaged switches were too similar for any one to stand out as an Editors' Choice. We can, however, grant the D-Link DSS-16 Fast Ethernet Switch 2 honorable mention for its value.



Cisco Systems, Compaq Computer Corp., Hewlett-Packard Co., Nortel Networks Corp., and 3Com Corp. Except for the 3Com product, which during testing was available only as a 36-port unit, all the switches came with 24 ports. All had the ability to add optional high-speed port modules for connection to a fiber-optic cable. A fiber-optic backbone connection helps increase the speed of the switches or the distance between them. The sophisticated management capabilities provide for remote control and detailed reporting through the Simple Network Management Protocol (SNMP).

These high-end switches generally have street prices around $100 per port. Similar managed hubs might start at $75 per port, but they lose their economic benefit as rising network traffic generated by new applications—many connected to the Internet—drives the need for more segmentation with hubs.

Gigabit Ethernet is a technology with evolving standards. The switch vendors offer Gigabit Interface Connectors (GBICs) with several different technologies. The 1000Base-SX GBICs yield multimode, fiber-optic cable connections ranging from 850 to 1,800 feet. The 1000Base-LX GBICs can pump out data up to 1.8 miles (3 kilometers) over single-mode fiber. The LX adapters cost $500 to $1,000 more than the SX because of the required laser technology.

All of the higher-end switches except the Compaq SW3324 offer a function called port aggregation. As the diagram "Switches on a Corporate Network" illustrates, this feature improves reliability and throughput by allowing two or more 100-Mbps ports to carry the backbone load in parallel between switches. This connection can eliminate the cost of a fiber-optic backbone link. The ATI and Nortel switches had the best performance across aggregated ports, but the Nortel switch was easier to set up. The 3Com switch dropped behind the pack in aggregated port performance.

The second group of 10/100 switches—the unmanaged ones—was made up of products from D-Link Systems, Farallon Communications, Intel Corp., Linksys, and Nortel Networks Corp. Each switch we tested had 16 ports, but no fiber-optic ports and no SNMP management. They're as small as hubs and as easy to install. Although they cost $30 per port compared with a simple hub's $10 per port, they quickly pay for themselves by avoiding the costs of reconfiguring the network as new applications come along. One installation note: Each of these switches has a shrill and annoying fan. The office location you pick for the switch might change when you plug it in and hear the noise.

The more expensive managed switches probably fit best in a corporate network that utilizes network management services. The optional connection modules also make these switches useful in small business settings where long distances separate two LANs. The lower-cost, unmanaged switches are perfect for any small office. They offer high speed and create a network that you won't have to reconfigure when you add new applications.

DEVIL IN THE DETAILS

No switch is radically different from the others in its category. These products conform to stringent standards and protocols and use chips from the same manufacturers. In general, the differences in the high-end products are in scalability—how well they

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grow with your needs—and in their management capabilities. Our Editors' choice, the Cisco Catalyst 3524 XL, leads the league in growth options, such as the ability to cluster switches through various ports and to manage a cluster through a single IP address.

We pushed the high-end switches to maximum performance. We tested them in pairs with Gigabit Ethernet connections between them in order to evaluate how well they buffered the traffic going between the ports at different transmission speeds.

For the most part, the differences showed up in relatively unimportant areas such as the maximum number of MAC (Media Access Control) addresses (the physical address of a device connected to the network) that the switches could handle. But the issue of latency (or delay) is becoming more important—particularly for voice-over-IP applications. Products from ATI, Cisco, and HP did particularly well in this area. Although the differences we found won't show up in any ordinary network—and other factors, such as processing IP, have a greater overall effect on latency—the top performers have a better-than-ordinary margin of performance.

The higher-end switches also differ in their management options. All of them report status and accept commands through SNMP. HP also includes TopTools, management software for the administrator's PC. All the products can be managed via a browser, but there are differences. When you point your browser at the ATI switch, it will show only text messages, but the HP's HTTP session offers detailed and intuitive management pages.

Among the unmanaged switches, a $380 street price makes the D-Link DSS-16 an outstanding value. But frankly, we'd pay any vendor a bit more to eliminate fan noise. Features such as the ability to auto-sense between 10 and 100 Mbps, half- and full-duplex settings, and adequate status lights are standard on all products.

The era of the hub is over. Long live the switch!

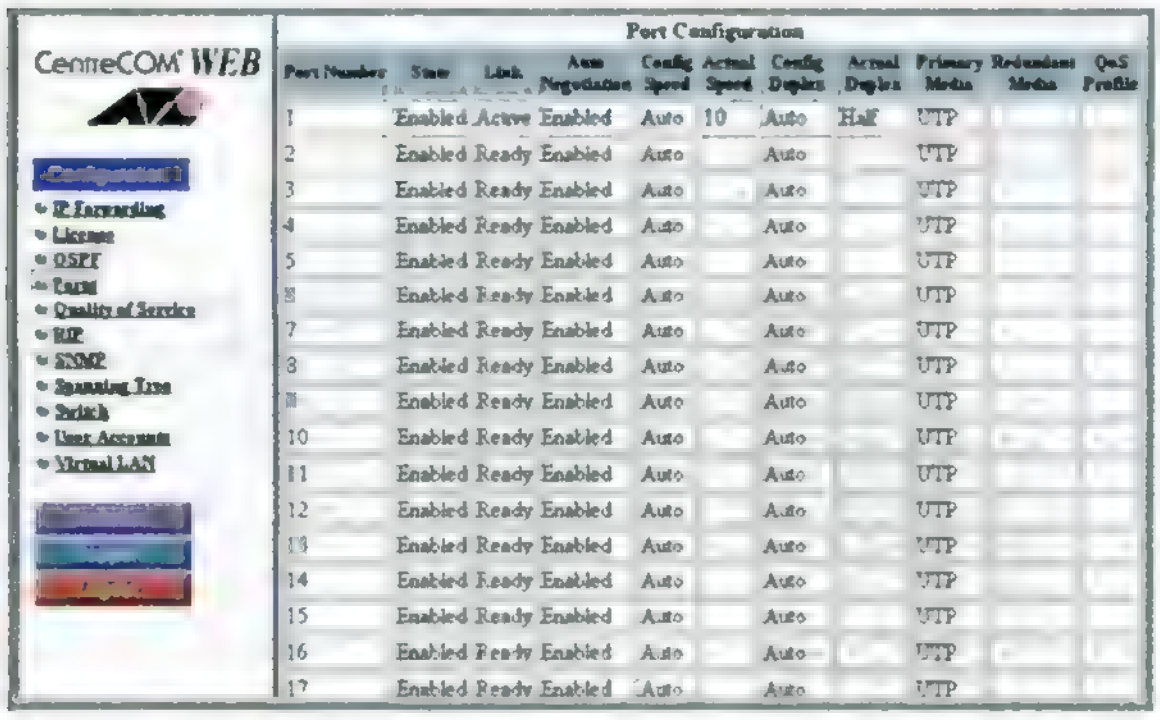
MANAGED SWITCHES

All reviews by Steve Rigney

Allied Telesyn AT-8525SX

$5,495 list. Sunnyvale, CA; 800-424-4284, 408-730-0950; www.alliedtelesyn.com.

● Allied Telesyn International Corp. (ATI) has a reputation for offering high-quality, inexpensive network products. But at $5,495 list, the AT-8525SX is one of the more expensive products in this group, mainly because this particular switch is made by Extreme Networks. (We did, however, find a street price of $400.) This 24-port switch with a 1000Base-SX GBIC provides a second redundant slot for adding another Gigabit uplink. Like the Compaq SW3324, the AT-8525SX doesn't provide a stacking option, but it does include an embedded HTTP server.



Our test unit came with a setup manual that consisted of only several pages. The rest of the documentation, including command line instructions and a user guide, are available for download on the ATI Web site. The download was large—approximately 3MB—but the manuals were well written and provided us with all the instructions we needed.

The AT-8525SX command line interface, which you access via telnet or a console, is somewhat confusing if you aren't familiar with the options. Unlike the command line interfaces of the other products in this roundup, the AT-8525SX doesn't offer any menu options, and you must type every command manually. Fortunately, we were able to use the embedded HTTP server to completely configure and monitor the switch. The browser interface is straightforward, but not as graphical as that of the HP ProCurve or Cisco Catalyst cluster views. The information is provided as text only, and if you want to see graphs, you have to create your own.

As far as port aggregation, the AT-8525SX offers good flexibility and is able to handle up to 25 groups of 4 ports each. It also works with an SNMP management console and includes RMON information for third-party management.

The lack of a stacking option limits the scalability of the AT-8525SX, but ATI does offer a 48-port version for $7,995 (list) that provides two GBIC modules. Both models are software upgradable to layer-3 routing. Like many of the switches in this roundup, the AT-8525SX experienced problems with large numbers of MAC addresses. This means that it should perform adequately on most networks, except for very large LAN segments with hundreds of users. Most networks of this size are subnetted to decrease excessive traffic anyway, and the limited MAC address table should suffice. The AT-8525SX did provide excellent port aggregation and very low latency.

Cisco Catalyst 3524 XL

$3,495 list. San Jose, CA; 800-553-6387, 408-526-4000; www.cisco.com.

PC MAGAZINE EDITORS' CHOICE

Our Editors' Choice, the Cisco Catalyst 3524 XL, is easily the most flexible and scalable switch in this group. Its stacking features, point-to-point connections, and clustering make the 3524 XL a good solution for both small workgroups and large enterprise networks. An embedded HTTP server combined with the stan-

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dard IOS command line interface render the 3524 XL easy to configure and manage. Last but not least, we found its street price of $2,520 to be one of the least expensive 24-port managed switches on the market, second in this roundup only to the HP ProCurve.

The 3524 XL has slots for two GBICs, which cost $500 and $1,500, respectively, for the 1000Base-SX and LX models; the stacking option is $250 per switch. Cisco also offers an enterprise version of the Catalyst 3524 XL, which retails for $3,995 and includes extra embedded software, such as a TACACS+ authentication server and enhanced end-to-end VLAN capabilities. Both versions of the software include the Cisco Visual Switch Manager embedded HTTP server and the clustering command software.

If you just need to add ports, the easiest solution is to use the $250 GigaStack modules to connect up to nine Catalyst switches at 1 Gbps. For better performance, you can add a Catalyst 3508 GXL eight-port Gigabit switch and connect up to eight Catalyst 3524 units back to the 3508 via a 5-Gbps backplane. This configuration results in more ports and better performance than standard stacking.

Our favorite feature of the Catalyst 3524 XL is its unique ability to cluster the switches using any Cisco 10/100-Mbps or Gbps ports. This new technology lets you connect up to 16 Cisco switches and manage them all via a single IP address. The switches can consist of different models, including Catalyst 3500 XL, 2900 XL, and 1900 devices. This saves you not only 15 IP addresses but also a lot of administrative time. With clustering enabled, you can point your browser at that one IP address and manage all 16 devices. You can view statistics, make changes, and monitor performance. You can also upload software or reboot all 16 devices from a single browser connection.

With a 10-Gbps switching fabric, we expected the 3524 XL to perform at wire speed on all of the ports. It did not quite meet that goal, but it came close. The 3524 XL doesn't offer the best port aggregation, because all clients are not treated equally, and its MAC address table may not be large enough for top-notch performance on large LAN segments. However, with the segmentation and connectivity options of the switch, these problem should not be an issue for most installations.

The Cisco Catalyst's cluster manager can manage 16 Cisco devices using a single browser and IP address.

Manageability relates to how easy a product is to configure and maintain. Clean command-line interfaces and management software are key. Web-based management is a huge plus, but it must be quick, easy to navigate, and cover most if not all of the switch's core features.

Scalability involves several factors, such as stacking capabilities, diversity of media options, expansion ports, backplane speed, and VLAN options. Big pluses are the ability to manage multiple stacked switches as a single unit and a management interface that can access all the switches in a LAN at once.

	Manageability	Scalability
Allied Telesyn AT-8525SX	Good	Good
EDITORS' CHOICE Cisco Catalyst 3524 XL	Excellent	Excellent
Compaq SW3324 Dual-Speed Switch	Fair	Fair
HP ProCurve Switch 2424M	Excellent	Good
Nortel BayStack 450-24T	Fair	Good
3Com SuperStack II Switch 3900	Good	Good

Compaq SW3324 Dual-Speed Switch

$3,560 street. Houston; 800-433-2391, 281-370-0670; www.compaq.com.

● Because it doesn't offer a stacking alternative—other than using the optional GBIC module—the Compaq SW3324 Dual-Speed Switch is not as scalable as most of the other products in this review. The unit does offer exceptional proprietary management software, but the separate browser management doesn't provide the same features as the embedded HTTP servers in the HP ProCurve and 3Com SuperStack.

The Compaq's $3,560 street price includes a 1000Base-SX GBIC module, and the unit has a second slot for a GBIC, but you can use it only as a hot spare. The SW3324 offers a backplane speed of 4.2 Gbps, which is more than the average traffic load on most LANs.

Like most of the other switches in this review, the SW3324 hardware is easy to install. To monitor and manage the unit across the network, you'll need to assign an IP address using Windows NT DHCP or a console and serial cable. In addition to telnet and console connections, the switch comes bundled with the Compaq Networking Management Software (CNMS) package. CNMS requires Microsoft Windows NT and an ISAPI-compliant HTTP server, such as IIS. The software does work via HTML pages, but the HTTP server does not run on the switch, and if

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www.pcmag.com/hotlinks

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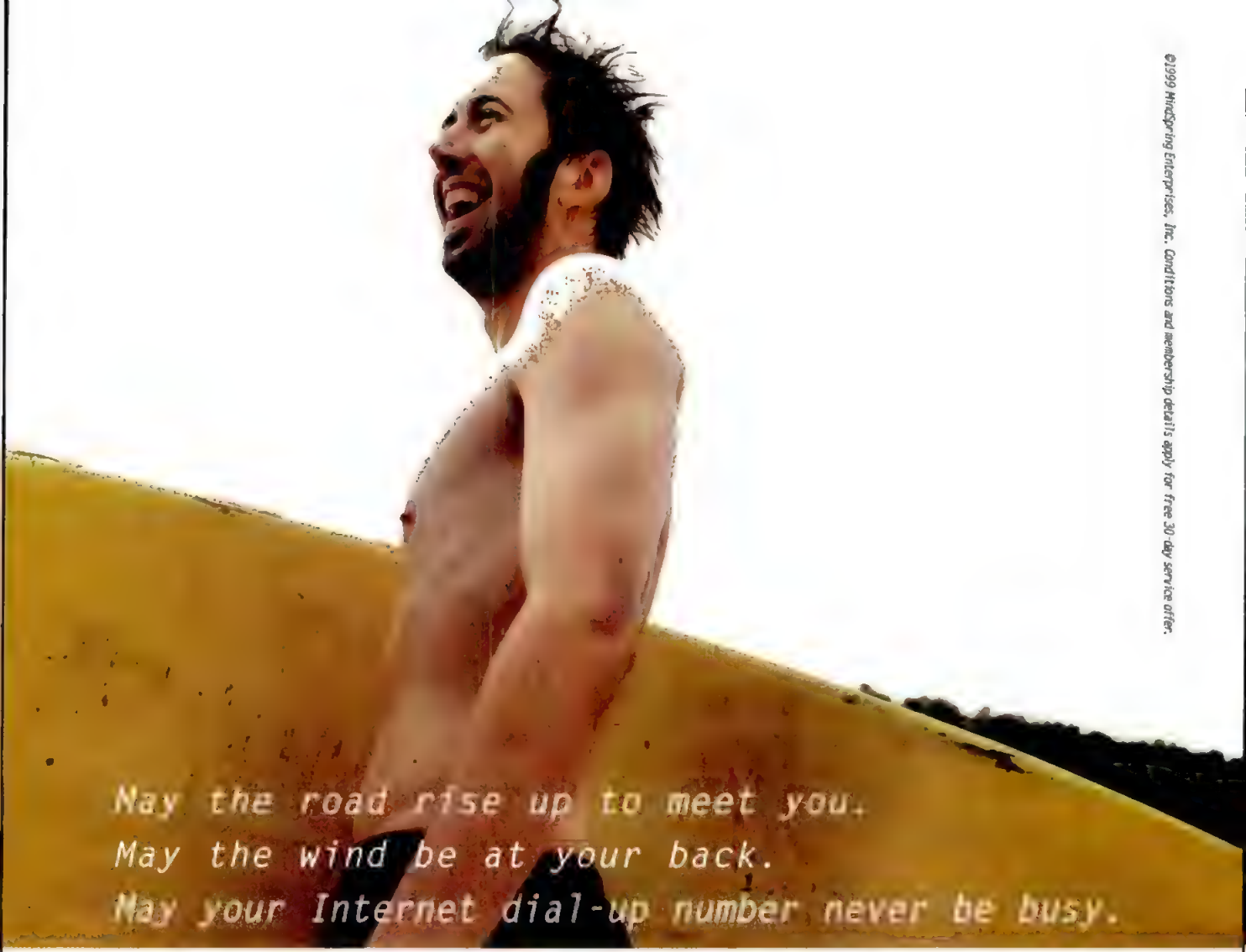
➤ **Lantronix Technology Tutorials**
www.lantronix.com/technology/tutorials
These online tutorials cover the basics on how networks work and how to set up your own.

➤ **Gigabit Ethernet Alliance**
www.gigabit-ethernet.org
An industry forum to promote Gigabit Ethernet. Look here for conference and meeting schedules, white papers, and news; and check out the weekly "Gigabit" factoids.



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PERFORMANCE TESTS

Managed Switches

Despite the rigorous testing PC Magazine Labs performed on these managed switches, they all passed. This means that any one of them can handle the load you're likely to find on your network.

A switch's core job is straightforward: Ensure that all frames get to their destination in an orderly and timely fashion. We measured how well the switches meet this challenge with two testbeds, one using an industry-standard test tool called SmartBits, from NetCom Systems, and the other using up to 48 client machines and Ganymede's Chariot. SmartBits, our primary tool, can simulate nearly any kind of Ethernet frame in almost any traffic pattern at or even above wire speed (the theoretical maximum speed of Ethernet).

Our performance tests reveal that for most situations, all of the products reviewed provide the bandwidth you need. In many cases we stressed these products well beyond the limits of most typical LANs before we could discern appreciable performance differences.

The first graph shows the SmartBits X-Stream Frame Loss test, which simulates one of the worst-case scenarios a switch could ever encounter: all ports transmitting to every other port at a specified load. Even under these brutal conditions, none of the products dropped frames at loads under 80 percent (your average network load is generally well below 40 percent).

Besides core functionality, there are several other performance aspects you should consider; their importance is dictated by what you plan to do with your network. The test results below will help you decide which features you should care about and which products will be your best fit.—*Analysis written by Kevin Young*

X-STREAM FRAME LOSS

Percent of packets lost
Low scores are best.
○ No frames lost (perfect score).
denotes Editors' Choice.

	90 percent load	100 percent load
Allied Telesyn AT-8525SX	○	○
Cisco Catalyst 3524 XL	○	○
Compaq SW3324 Dual-Speed Switch	11	19
HP ProCurve Switch 2424M	○	○
Nortel Baystack 450-24T	7	16
3Com SuperStack II Switch 3900	○	○

◀ The core performance of these six switches was relatively similar. So if you aren't planning on doing anything out of the ordinary, base your decision on price, warranty, and support.

SWITCH BROADCAST LATENCY

Microseconds
denotes Editors' Choice.

	64 bytes	512 bytes	1,518 bytes
Allied Telesyn AT-8525SX	9.3	9.2	9.0
Cisco Catalyst 3524 XL	12.2	12.3	12.2
Compaq SW3324 Dual-Speed Switch	5.0	6.2	17.4
HP ProCurve Switch 2424M	3.9	9.8	41.8
Nortel Baystack 450-24T	5.2	8.7	40.0
3Com SuperStack II Switch 3900	10.0	19.6	66.1

BETTER

▲ If you plan to implement VoIP, videoconferencing, or other time-sensitive traffic, latency is key. Latency is the amount of time that elapses between the last bit of an Ethernet frame entering the switch and the first bit exiting. Naturally, the lower the score the better. Generally, we observed two results: The Allied Telesyn (ATI) and Cisco switches forwarded frames at the same rate regardless of frame size or the amount of load on the switch. The Compaq, Hewlett-Packard, Nortel Networks, and 3Com products displayed higher latencies as the frame size increased. Interestingly, the HP switch demonstrated the lowest latency overall, at least with 64-byte frames.

PORT AGGREGATION

Megabits per second
denotes Editors' Choice.
Minimum ● Average ▮ Maximum

Allied Telesyn AT-8525SX
Cisco Catalyst 3524 XL
HP ProCurve Switch 2424M
Nortel Baystack 450-24T
3Com SuperStack II Switch 3900

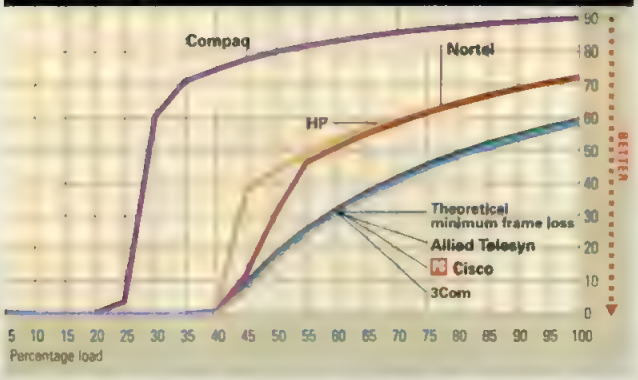
The Compaq unit does not support port aggregation

10 15 20 25 30 35
BETTER

▲ If you want to implement an alternative backbone technology by aggregating several Fast Ethernet links, this is an attractive alternative to expensive Gigabit fiber-optic connections. This graph shows the throughput of four aggregated Fast Ethernet ports and also the variability of the individual client throughput. Ideally, a switch should achieve the highest throughput with the smallest client range, meaning that all clients are treated equally.

FRAME LOSS ACROSS A GIGABIT BACKBONE

(1 MAC address per port)
Percent of frames lost

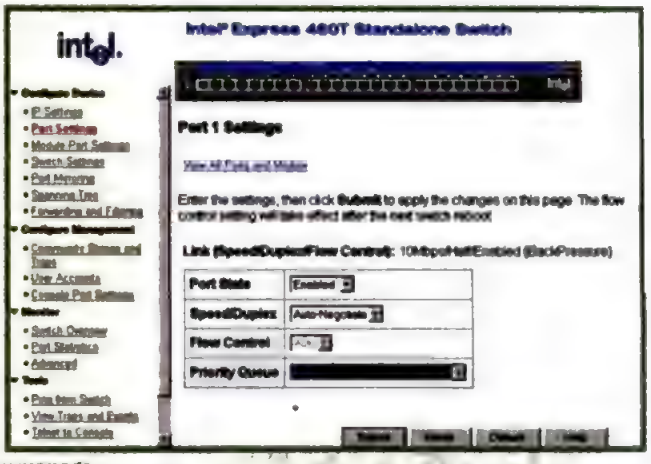


▲ If you want to connect switches to a Gigabit fiber-optic backbone, all except the Compaq switch can handle loads that don't oversaturate the backbone. Once the aggregate load from individual ports exceeded the total available on the backbone (43 Mbps per port multiplied by 24 ports is less than 1 Gbps), only the ATI, Cisco, and 3Com units forwarded the theoretical maximum frames.

The new Intel Express 460T standalone 24-port switch (which we tested in beta release, but which should be available by the time you read this) continues to bolster the company's lineup of small to medium-size enterprise networking gear. We generally found it to measure up well against the products in the main review, with clean Web-based management, low price ($2,000 list) and a small footprint. But its current lack of features such as VLANs, port aggregation, and stackability may exclude it from consideration by some. This will become less of an issue in Q1 of 2000, when a free firmware upgrade, which includes VLANs and aggregation, will be available.

Intel's Web-based management is one of its strengths. Options are presented in a familiar Explorer-like format and are easy to navigate, and you aren't forced to the command line to perform any tasks. In fact, the Web interface adds functionality by providing some port utilization graphs, a feature that aids in traffic pattern analysis. One gripe is the inability to configure multiple ports simultaneously from the browser. If you prefer the command line, the 460T has an easy-to-use text-based menu system.

Included with the 460T is Intel Device View, which lets you manage other Intel networking gear through a single interface. Intel Device View works either via a Windows application or via installation on a machine with a Web server (IIS 2.0, Peer Web Services, or Netscape Enterprise 3.01). This permits remote management of all the devices through a browser. (Intel Corp., Santa Clara, CA; 800-628-8686; 408-765-8080; *www.intel.com*.)



The 460T's Explorer-like Web interface makes configuration simple.

you want to manage it from a remote PC, you'll need a high-end Windows NT–based client system running IIS.

Because it is more powerful and because the browser interface is not really very portable, we relied mainly on the proprietary software to manage and configure the switch. The CNMS Windows-based application offers better views of the ports and switch and lets you create graphs showing utilization. We also liked the ability to send any errors or alerts to an SNMP console, the Windows NT event log, or an e-mail address.

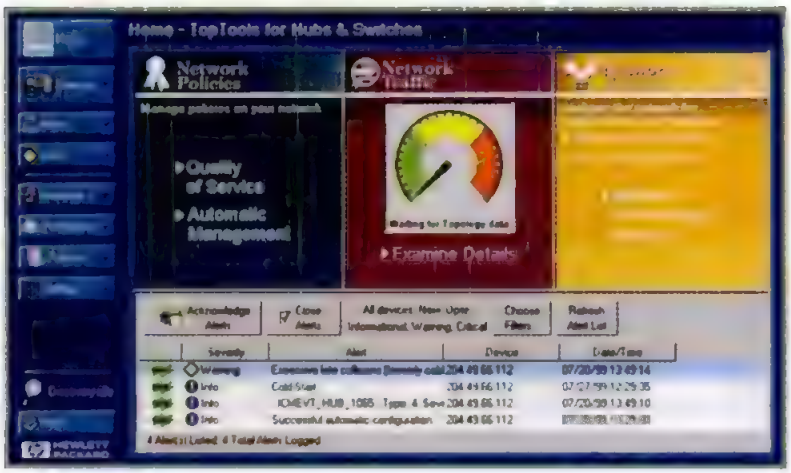
The SW3324 also offers a port-mirroring feature similar to the 3Com SuperStack's RAP feature. Port mirroring lets you designate a port to monitor and capture all of the traffic on another port. This is useful for running RMON probes and other analysis software. We found the documentation to be lacking, forcing us to answer questions and configure the different features of the switch mainly by trial and error. Despite its relatively poor performance on most of our tests, the unit is a decent solution for a workgroup even though it may not fit well in larger networks.

HP ProCurve Switch 2424M

$2,139 list. Palo Alto, CA; 800-752-0900, 650-857-1501; www.hp.com.

●Not only did we find the Hewlett-Packard HP ProCurve Switch 2424M to be one of the easiest to configure and manage, but at $2,139 list for the base 24-port unit, it is also the least expensive. The single expansion module can handle several different adapters, including a dual-port 1000Base-SX or LX GBIC, a Gigabit stack option, and even an eight-port 100Base-T hub. Combine this with the best implementation of an embedded Web server we saw in this roundup and you end up with our honorable mention winner. The only feature that kept the unit from winning an Editors' Choice designation was its scalability. You can stack up to seven 2424Ms as one device, but the Cisco Catalyst 3524 XL can handle 9 switches in a stack or 16 using the clustering manager.

We liked the low price of the 2424M's base unit, but to be fair, you have to consider what you pay for the options. The 1000Base-SX and LX modules are fairly inexpensive



The TopTools Software bundled with the HP ProCurve is a full-blown SNMP management utility that can do more than just monitor your switch.

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at $899 and $1,429 list, respectively, but the stacking kit costs $299. You can stack up to seven 2424M switches together, for a total of 168 ports. However, the optional stacking modules cost $639 for the Gigabit stack adapter and an additional $299 for the two transceivers and cable.

Installing the 2424M is a painless process. After you assign an IP address using a terminal program or allow the unit to lease an IP address from a DHCP server, you simply point your browser to the address of the switch. We found that the embedded HTTP server offers the most realistic view of the switch and provides the most intuitive features. If, for example, you receive an error in the log window, simply click on the error and another window appears with information on the error as well as possible steps for resolving it. In addition, for tasks that you can't perform using a browser (such as running a ping test to another device) the browser menu will automatically launch a telnet session to the switch. Only the 3Com SuperStack offers similar functionality.

For a more global picture, we installed the bundled HP TopTools SNMP management utility, which can also be used to monitor servers and other HP devices. In addition to the 100MB of disk space it uses, you also need to install the Windows NT 4.0 option pack, several other Windows NT utilities, and reboot your PC three or four times. But in return, the utility provides you with a wealth of information, including SNMP traps, network maps, traffic monitors, and port utilization.

A nice security feature of the 2424M is its ability to limit access to the management console based on certain IP addresses. The 3Com SuperStack also uses IP addresses for security, and the Cisco Catalyst uses MAC addresses. But either method should be secure for most networks. The 2424M provides acceptable performance for most workgroups, but like the majority of the switches in this roundup, it fell behind when the Gigabit uplink port was stressed to its limit.

Nortel BayStack 450-24T

$3,595 list. Santa Clara, CA; 800-822-9638, 408-988-2400; www.nortelnetworks.com.

● The Nortel BayStack 450-24T's failsafe cascading and its ability to stack up to eight switches make it a scalable solution. But its lone GBIC port, lack of an embedded HTTP server, and its SNMP management software, which required several installation attempts before we could make it work, detract from the overall appeal of this switch. Those points aside, the 450-24T should fit nicely in a Nortel-installed network and will work with the higher-end Optivity management software.

At $3,595 list for the base 24-port managed switch, the 450-24T is one of the more expensive solutions on the market, but we found it at a street price of around $2,300. But if you need to combine up to 244 ports in a single network device, it is one of your few choices. You still have to shell out $495 for each switch if you want the stacking option, and $1,495 for a 1000Base-SX or $1,995 for a 1000Base-LX GBIC uplink module. The stacking option does provide a redundant fail-over link in case a single unit in the chain goes down. The Cisco Catalyst also offers a redundant link, but it requires the use of one of the GBIC ports in addition to the stack port.

With a few exceptions, we found setting up the 450-24T easy. The other products in this roundup use a null-modem cable to connect to the console, but the 450-24T requires a straight-through serial cable. Likewise, the BootP option was disabled on our unit, so the switch didn't automatically lease an IP address from our DHCP/BootP server. After we found the right cable, we were able to set up the IP address and then use telnet sessions across the network to configure and monitor the switch.

By means of telnet and console connections, we were able to set up VLANs, configure each port, and monitor basic usage and errors. The only way to receive a notification of a fault is through an SNMP trap to the management console. Nortel is also working on an embedded HTTP server for future versions of the 450-24T.

If you prefer a graphical management interface, you can download the free Device Manager utility from the Nortel Web site. When we used the utility, we had a difficult time making the window expand

SUMMARY OF FEATURES

10/100 Managed Switches

■ YES □ NO	Allied Telesyn AT-8525SX	Cisco Catalyst 3524 XL	Compaq SW3324 Dual-Speed Switch	HP ProCurve Switch 2424M	Nortel BayStack 450-24T	3Com SuperStack II Switch 3900
Price	$5,495 list	$3,495 list	$3,560 street	$2,139 list	$3,595 list	$6,495 list
Number of ports	24	24	24	24	24	36
Built-in/optional gigabit ports	0 / 2	0 / 2	1 2	0 / 2	0 / 1	1 / 2
Maximum units in a stack	N/A	9	N/A	7	■	■
Backplane bandwidth	8.5 Gbps	10.0 Gbps	4.2 Gbps	3.2 Gbps	2.5 Gbps	25.6 Gbps
Maximum MAC addresses	128,000	8,192	20,000	10,000	16,000	16,000
MANAGEMENT						
Management software included	None	CVSM	CNMS	TopTools	Device Manager (must be downloaded)	None
Web-based management/SNMP	■■	■■	□■	■■	□■	■■
Embedded HTTP server	■	■	□	■	□	■
RMON	■	■	■	■	■	■
Number of groups	4	4	4	4	4	4
STANDARDS						
Flow control	802.3u, 802.3x	802.3x	802.3u 802.3x	802.3u, 802.3x	802.3u	802.3u
802.1p / 802.1q	■■	□■	■■	■■	■■	□■
Number of VLANs	256	250	4,094	30	1,536	127
IGMP support	■	□	□	■	■	□
Port aggregation	■	■	□	■	■	■
Warranty	1 year	Lifetime	3 years	Lifetime	1 year (parts only)	1 year
Technical-support hours (eastern time)	9:00–9:00 M–F	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days

N/A—Not applicable. This unit is not stackable.

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enough to show all of the options. We tried it on several different PCs running Windows 9*x* and Windows NT, as well as different screen resolutions. After the fourth or fifth installation and reboot of the PC, we were finally able to see a full graphical representation of the 450-24T. In addition to monitoring the ports visually, Device Manager allows you to create graphs based on utilization and to change switch and individual port settings manually.

The 450-24T lost a significant number of packets during our heavy load test. But on most networks, the 450-24T should be able to handle real-world traffic.

One GBIC is included with the 3Com SuperStack, but it also has two additional slots for either 1000Base-SX or -LX adapters.

3Com SuperStack II Switch 3900

$6,495 list. Santa Clara, CA; 800-638-3266, 408-326-5000; www.3com.com.

● Because 3Com was not able to provide a 24-port SuperStack II Switch 3900 in time for testing, we tested the 36-port version instead. Even taking into account the additional 12 ports, we were surprised by the SuperStack II's $6,495 list price. To its credit, the SuperStack is the only switch in this roundup to offer three Gigabit uplink ports, and the price also includes a 1000Base-SX module. But the SuperStack's unusual stacking topology doesn't provide fault tolerance or many options to connect to a Gigabit backbone.

Next to the HP ProCurve, the SuperStack offers the most useful embedded HTTP server of the products we reviewed. We also liked 3Com's Roving Analysis Port (RAP), which lets you assign one port to monitor another, much like the Compaq switch's port-mirroring feature. The RAP feature is great for network administrators who want to use remote-monitoring probe or other analytical device to monitor statistics and utilization.

As with all of the products in this roundup, you can populate the GBIC slots with either 1000Base-SX or -LX adapters. You can also stack up to four 3900 switches together for a total of 144 ports. The stacking topology, however, is different from that of all the other switches we reviewed. Rather than offering two stacking connections on the module (one for uplink and one for downlink) the 3900 requires you to designate an entire switch as the stacking base, and the three other switches in the stack must home run back to the base unit. This arrangement requires that all three modules on the first switch be used for stacking but doesn't provide any fault tolerance if that switch fails. The other switches we tested provide dual ports on the stacking module and automatically supply a fail-over link in case a single switch fails.

Although not as intuitive as the HP ProCurve's HTTP server, the SuperStack's embedded Web server is nonetheless very useful. For example, we could view a graphical image of the switch and automatically launch a telnet session to perform detailed tasks not available from a browser interface.

The printed documentation that comes with the SuperStack barely helps you set up the IP address and gives very little other information on accessing the HTTP server. We had to rely on the online documentation to walk us through most of the tasks. During testing, we ran out of available MAC addresses, but with the ability to handle 16,000 addresses, this limitation should be an issue only on very large flat networks.

UNMANAGED SWITCHES

All reviews by Steve Rigney

D-Link DSS-16 Fast Ethernet Switch 2

$539 list. Irvine, CA; 800-326-1688, 949-455-1688; www.dlink.com.

● At a list price of $539 and a street price of $380, the D-Link DSS-16 Fast Ethernet Switch 2 is about half the price of the other unmanaged switches reviewed here. Despite its low price, the DSS-16 is the only product in this roundup to provide two uplink (or MDI) ports. If you use the two separate uplink ports, however, the first two standard MDI-X ports do not work. So the end result is a maximum of only 16 connected devices, but it is a better solution than searching for crossover cables or being limited to a single uplink connection.

The switch is easy to install, and the manual does a decent job of explaining the product features, installation, and even the different types of cables and connections. Unless you need some type of management or an optional fiber-optic connection, which you can get with the Linksys EtherFast, the DSS-16 offers the best value of all the unmanaged switches we review here—which is why we singled it out to receive an honorable mention (we believe these unmanaged switches are too similar to select one as an Editors' Choice).

Farallon Fast Starlet Switch/16 PN9160

$1,000 list. San Leandro, CA; 510-346-8001 www.farallon.com.

● The Farallon Fast Starlet Switch/16 PN9160 may have the cutest name of all of the unmanaged switches in this roundup, but other than that, the device is fairly average. Farallon quotes a list price of $1,000 for the Fast Starlet, but we found it for $440 via a mail-order catalog. Like the Nortel NetGear FS516, the Fast Starlet includes 16 jumpers on the back of the unit that you can use to force all of the ports into full-duplex mode.

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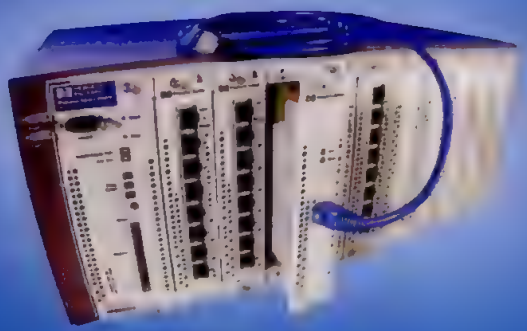

Switch 4000M
10/100/Gigabit

HP ProCurve 4000M $89 per port
3Com SuperStack II 3300 $156 per port
Bay Networks 450T $173 per port
Cisco 3524XL $156 per port
72-port configuration list prices

Switch 2424M
10/100/Gigabit

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The five unmanaged switches we reviewed—the D-Link DSS-16, the Farallon Fast Starlet, the Intel Express 410T, the Linksys EtherFast, and the Nortel NetGear FS516—share many of the same features, and any one of them is a better choice than a hub.

Users will find the Fast Starlet's manual very helpful. In addition to basic information on installing the switch and a list of the features, the documentation includes dozens of different network diagrams. These diagrams show almost every device you could ever imagine connecting to the switch and provide a good tutorial for the new administrator.

Intel Express 410T Standalone Switch

$1,099 list. Santa Clara, CA; 800-628-8686, 408-765-8080; www.intel.com.

● The Intel Express 410T Standalone Switch is the only unmanaged switch reviewed here that offers a console to configure the speed, duplex setting, and the flow control of each individual port. But the console doesn't supply any utilization or performance information.

The 410T is the only switch that lets you disable flow control on the ports. Flow control keeps the switch from losing packets; however, it can also reduce performance, though it does so only with the most time-sensitive applications. At $1,099 list, the 410T is also the most expensive switch in the review, but we found it online for about $780.

Setting up an unmanaged switch is a fairly easy task, and all of the products in this roundup include acceptable documentation to answer the most basic questions and walk you through the installation process. Intel, however, takes ease of installation one step further by including a user FAQ and troubleshooting section to help you with any unforeseen problems you might encounter.

Linksys EtherFast 16-Port 10/100 Auto-Sensing Switch

$1,000 list. Irvine, CA; 800-546-5797, 949-261-1288; www.linksys.com.

● Although the Linksys EtherFast 16-Port 10/100 Auto-Sensing Switch lists for $1,000, you should be able to purchase it online for about $750. With the EtherFast you have the option of buying a unique growth feature: an 100Base-FX fiber-optic module. Priced at $240 list and available with either a SC and ST connector, this module is a great way to connect the EtherFast to a fiber-optic Gigabit backbone. The fiber-optic connection can stretch as far as 2 kilometers, which makes the EtherFast a good solution for a small office in a campus environment.

Nortel NetGear FS516

$950 list. Santa Clara, CA; 800-822-9638, 408-988-2400; netgear.baynetworks.com.

● What you notice first about the Nortel NetGear FS516 Ethernet switch is its dark blue color and small chassis. At only 13 inches wide, the FS516 is the smallest switch we review here, but fortunately the package comes with brackets so that you can mount the device in a standard 19-inch rack.

With a list price of $950, the FS516 is one of the more expensive of the unmanaged switches we looked at. But we found the FS516 for about $680 (street). The FS516 has the same 16 DIP switches on its back as the Farallon Fast Starlet. These switches let you force a port into full duplex mode in case a device doesn't work with the auto-sensing feature. But apart from its color and small size, the FS516 doesn't provide any unique features. PC

SUMMARY OF FEATURES

16-Port 10/100 Unmanaged Switches

	D-Link DSS-16+ Fast Ethernet Switch 2	Farallon Fast Starlet Switch/16 PN9160	Intel Express 410T Standalone Switch	Linksys EtherFast 16-Port 10/100 Auto-sensing Switch	Nortel NetGear FS516
List/street price	$[illegible] $380	$[illegible] $440	$[illegible] $780	$1,000 / $600	$950 / $680
Available modules	0	0	0	1	0
MAC addresses per switch	1,024	8,000	12,000	16,000	4,000
Flow control	802.3x	802.3u, 802.3x	802.3x	802.3u, 802.3x	None
Supports spanning-tree protocol	■	■	□	□	□
Warranty	Lifetime	3 years	3 years	5 years	5 years
Technical support (eastern time)	9:00–9:00 M–F	10:00–7:30 M–F	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days

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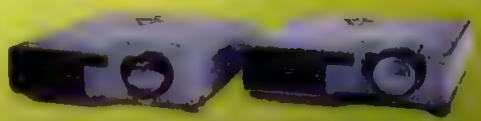

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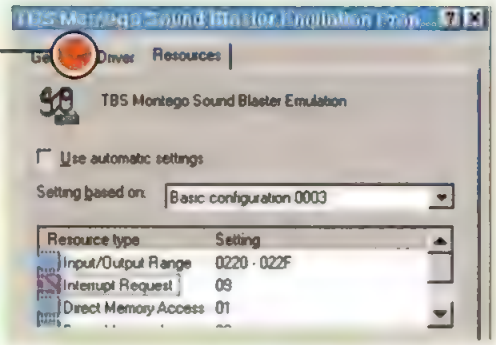
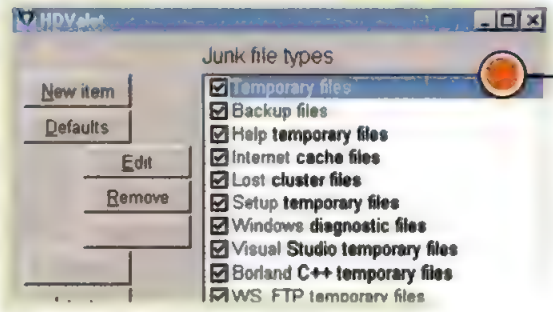


Solve device conflicts with Microsoft Windows' Device Manager. *Page 210*

Protect the data on your palmtop. *Page 235*

Stamp out the Office Assistant and other annoyances in Windows 2000. *Page 227*



Clean up the junk files on your hard disk with this issue's free utility. *Page 245*

DESKTOP 218

Windows' Device Manager is your ticket to resolving resource conflicts.

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Stave off unwanted junk e-mail with these spam prevention tactics.

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Microsoft Office 2000 offers "conveniences" you may prefer to do without.

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How to protect the data on your palmtop computer.

UTILITIES 245

HDValet cleans out useless junk files from your hard disk.

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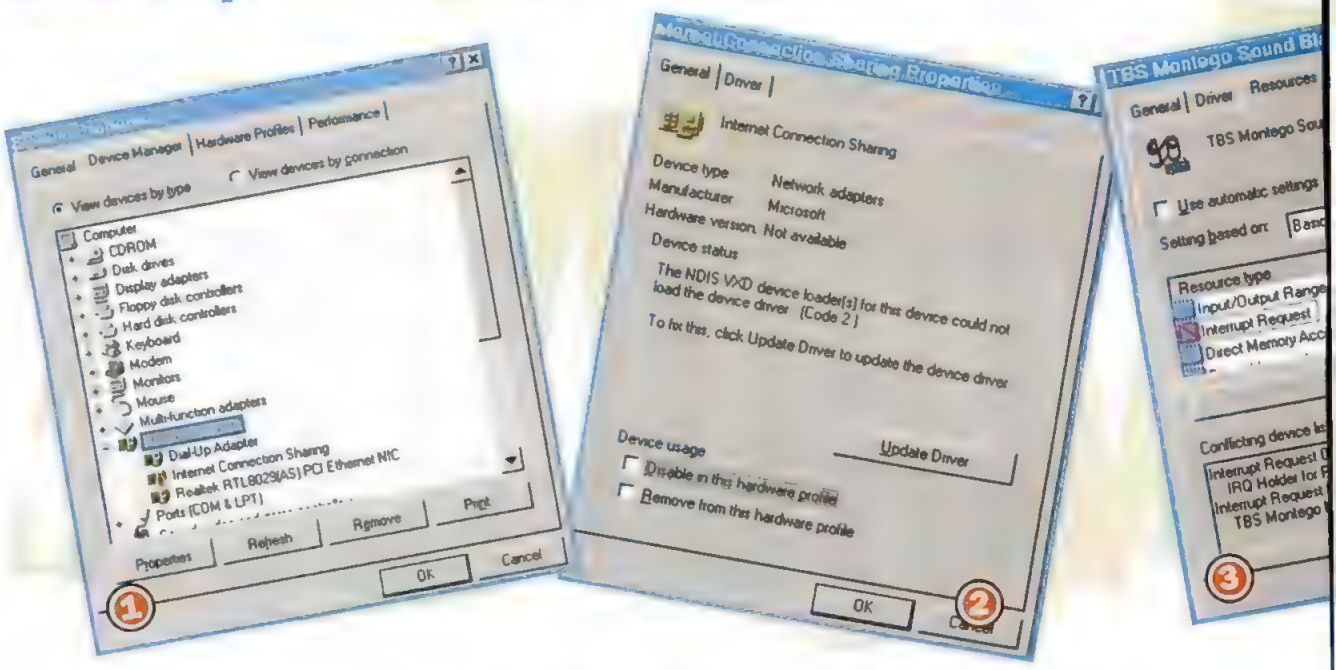


1. List hardware. Device Manager shows you the categories of hardware on your computer and lets you see which devices are working correctly and which have problems.

2. Pinpoint problems. You can see the nature of a problem in a device's *Properties* dialog. In this example, the problem is with the device driver and you are advised to update the driver.

3. Resolve conflicts. In many cases, a hardware conflict results when a device attempts to use a resource already claimed by another device. Here, IRQ 9 is the problematic resource.

4. Trial and error. Device Manager lets you specify the resources you want a device to use. You may have to try several before you get a *No devices are conflicting* message.

5. Advanced topics. The *System devices* area of Device Manager lets you learn a great deal about your system, including a number of devices you may not even know about.

Resolving Device Conflicts

Device Manager gives you an easy way to resolve hardware conflicts—and learn more about your system. *By Neil Randall*

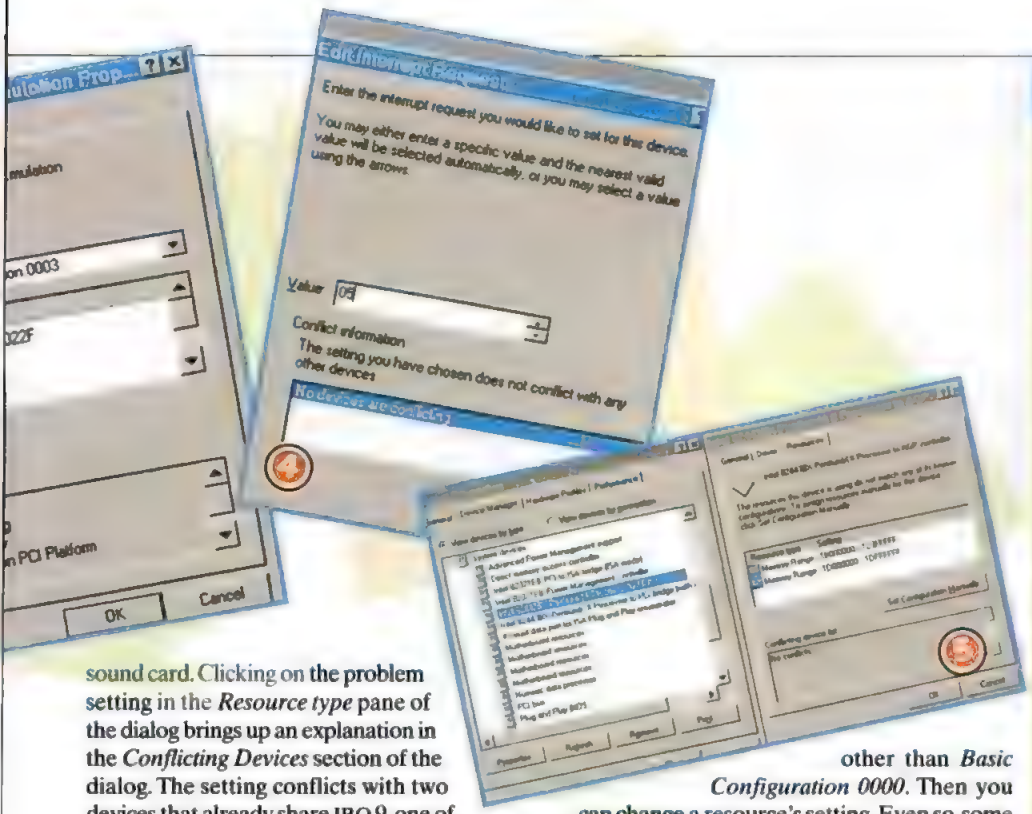
There's no question that with the plug-and-play features of Windows 95 and 98, life with hardware has been a lot easier than it was in the PC's past. There's a very good chance these days that if you buy a new piece of hardware and install it into your machine, it will actually work. Windows 2000 promises a similar success record, and the most recent beta seems to bear this promise out. But plug-and-play doesn't do it all; there are still times when hardware doesn't work, and the task of solving the problem falls to you.

To help with such situations, Windows 9x offers a utility. Device Manager lets you see which of your machine's hardware devices are operating correctly and which have resource conflicts or other problems, and it lets you attempt to fix hardware problems by changing the computer resources each piece of hardware will use. Device Manager is accessible via the System applet in *Control Panel*, or more quickly by right-clicking the *My Computer* icon on the desktop and selecting *Properties*. In either case, you'll get the *System Properties* box, with *Device Manager* showing on the second tab from the left. Device Manager is also available in Windows 2000 (but not Windows NT 4 or earlier), again through the *System* icon in *Control Panel*.

As Figure 1 shows, opening Device Manager reveals the categories of hardware on your computer. Clicking on the plus sign beside a category shows the list of specific hardware devices within that category. If a problem with a device exists, Device Manager will open with that category already expanded, as is the case here. Device Manager displays two levels of problem alerts: a circled exclamation point (with a yellow background) tells you that the device isn't functioning properly, while a circled X (with a red background) tells you that the device is disabled. In this case, there's a problem with the Internet Connection Sharing device.

To examine the settings for a particular hardware device, double-click on it (or single-click and then click the *Properties* button). You'll see the *Properties* dialog for that particular device (Figure 2). The associated *Properties* dialog shows that the problem lies in the device driver; clicking the *Update Driver* button starts the Update Device Driver wizard, which allows you to select a driver manually or have Windows search for one in a specified path or on Microsoft's Windows Update Web site.

In many cases, the *Properties* box for a problematic device will reveal a hardware conflict resulting from the device attempting to use a particular resource assignment—such as an interrupt request (IRQ), a memory range, an input-output (I/O) address range, or a direct memory access (DMA) range. Figure 3 shows a conflict in the IRQ setting for the Sound Blaster emulation portion of the system's Turtle Beach



sound card. Clicking on the problem setting in the *Resource type* pane of the dialog brings up an explanation in the *Conflicting Devices* section of the dialog. The setting conflicts with two devices that already share IRQ 9, one of which, ironically enough, is another part of the sound card.

You can use Device Manager to specify the resources you want a device to use. Click on the conflicting resource's type in the *Properties* dialog for that device, then click the *Change Setting* button. This yields the *Edit* dialog for that resource type. Clicking the up or down arrows beside the *Value* field changes the value, and with each selection the *Conflict information* pane tells you what devices are already using your selected resource. Your goal is to locate a value that gives you the message *No devices are conflicting* (see Figure 4).

Despite this powerful ability to specify resource assignments, however, your best bet by far is to let Windows handle the assignments itself. In the top portion of the *Resources* area of any *Properties* dialog (see Figure 3 above, for example), you'll find a check box labeled *Use automatic settings*. This box is checked by default in all *Resources* dialogs, thereby allowing Windows to work with and assign the full range of available resources at boot time. This is the ideal scenario, because Windows can juggle resources as needed without you having to worry. The only time you should ever need to specify resources manually is if Device Manager displays a problem with a device. If you do select a resource manually, you are circumventing Windows' ability to work with that setting, and the result could be additional hardware conflicts.

To change a setting, you must first uncheck the *Use automatic settings* feature. Then you must click on the arrow beside the field labeled *Setting based on* and choose a configuration other than *Basic Configuration 0000*. Then you can change a resource's setting. Even so, some settings are unalterable no matter what you do: In some cases, only *Basic Configuration 0000* is available, and in other cases, some of the settings are locked in place. This is controlled by the device driver itself, which is supplied by the device manufacturer. Drivers for sound cards are likely to have several configurations, while drivers for other types of devices, such as display adapters, are likely to have only one. These devices demand specific resources to work properly, and changing these resources will render them nonfunctional.

You can also use Device Manager to learn a great deal about your machine. One particularly interesting area is the device type called *System devices*; clicking on the plus sign beside *System devices* lets you see how Windows has configured more than 20 devices that you might not even know exist (Figure 5). These include the PCI bus, the motherboard resources, even the system clock and system speaker. By all means look at these, but let Windows handle them unless you have a very specific reason to interfere. You can easily render your machine unusable by configuring the resources for these device types manually.

You can also get overviews from Device Manager about how your machine is assigning system resources. For example, double-clicking on the device type called *Computer* reveals the *Computer Properties* dialog. Selecting the radio buttons at the top of this dialog shows you the current resource assignments for IRQ, I/O, DMA, and memory, respectively. (You can also get this information through Windows 98's System Information tool.) The *Reserve*

Access Folders with a Toolbar

I discovered an amazing feature of Microsoft Internet Explorer 5! First, right-click the taskbar, choosing *Toolbars | New Toolbar*, then navigate to any drive or folder, and press *OK*. As you'll see, a new toolbar will be created, displaying the contents of that folder. Resize the toolbar so all you see is the double arrow (>>). Click the arrow and you will be able to view everything under that folder!

There are many possibilities with this feature. I added direct links to my Favorites, Programs, and Control Panel folders. If you want the ultimate, create a toolbar for the Desktop folder—then you can view every file in the computer!

Scott Newman
Dresher, Pennsylvania

With so many ways to access drives and folders, why do we need another? The virtue of the technique described here is that toolbars are accessible even when the desktop is entirely covered, and they're available immediately, without navigating through levels of the Start menu. If you're running Internet Explorer 5, give this tip a try.—*Neil J. Rubenking*

Windows Desktop Update

I tried to create a shortcut using rundll32.exe as presented in your issue of February 23, but I keep getting the message:

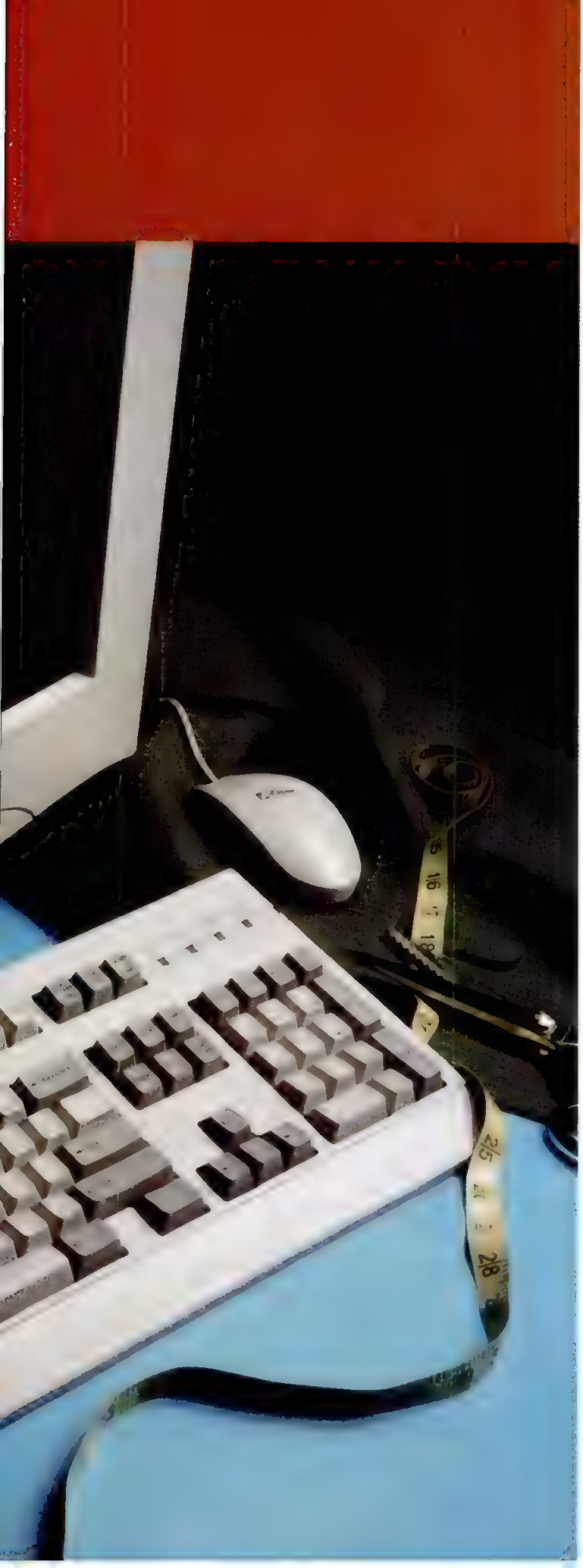
```
Error in Shell32.dll
Missing
Entry:SHExitWindowsEx
```

What could be the problem?

Jay Anderson
via the Internet

What you need is the Windows Desktop Update, available with Microsoft Internet Explorer 4 or Windows 98 (not, oddly enough, IE5), that will update shell32.dll. In the original shell32.dll, the function `SHExitWindowsEx` is not exposed for access by rundll32. If you install IE4 and its Windows Desktop Update, the tip we published should work just fine. And it should continue working even if you uninstall IE4, as long as you leave the Windows Desktop Update in place.—*NJR*

The Custom Fit



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AOACPC 99RE-PCUS

TO USER

Display a Message Before Log-On

You can create a message box that will appear just before a user logs on to the computer. Launch Regedit and navigate to `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\WinLogon`. Right-click in the right-hand pane, select *New | String Value*, and name the value `LegalNoticeCaption`. Double-click it and enter the text you want in the box's caption. Using the same method, create a value named `LegalNoticeText` containing the text to be displayed in the dialog box. Now each time anyone logs into the computer, your message will appear.

Adnan Pang
Richmond, British Columbia

You can use the Registry key shown above for Microsoft Windows 95 or Windows 98; under Windows NT, you can use `HKEY LOCAL MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\WinLogon`. —NJR

Resources tab lets you tell Windows not to use any of these resources; you would use them only if you had a legacy peripheral that absolutely required a specific resource. Again, however, keeping a resource out of Windows' control limits the number of hardware situations the operating system can resolve automatically.

In some cases, you can use Device Manager to work with hardware whose configuration is accessible elsewhere. You can establish your modem's setting through the *Modems* icon in *Control Panel*, for example, but the complete modem profile is available by opening the *Properties* dialog for your modem from Device Manager. In this sense, Device Manager is your one-stop hardware resource.

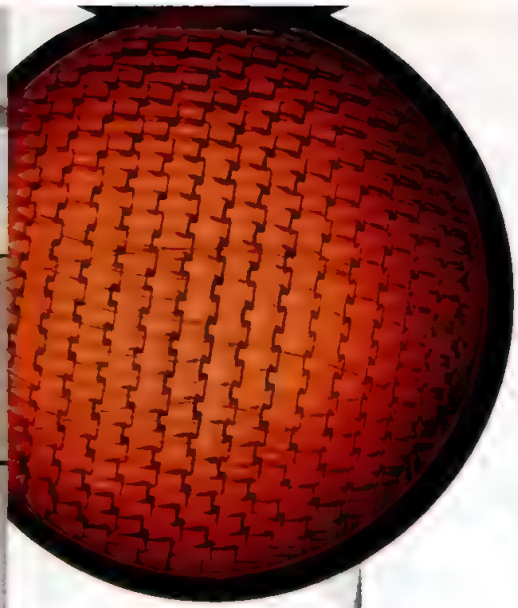
Device Manager can't solve all your hardware problems. Despite the substantial improvements Windows has introduced into the area of hardware configuration, resource values are finite. At some point, if you add enough devices, you'll encounter an irresolvable conflict that will force you to take a device out of the case and do without it. But for resolving the majority of conflicts and driver problems, Device Manager is an essential resource. PC

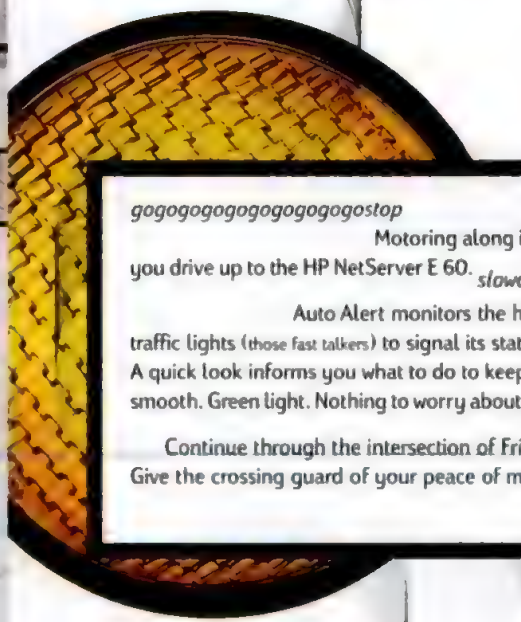
Neil Randall is a contributing editor of PC Magazine.

CRIB SHEET

UPDATING YOUR VIDEO DRIVER

1. Expand the Display adapters type in Device Manager.
2. Double-click on the display adapter name to open its *Properties* dialog.
3. Select the *Driver* tab.
4. Click the *Driver File Details* button to see the driver provider and version number, for your information. Select *OK* to close.
5. Go to the video card manufacturer's Web site and download the latest driver.
6. Click the *Update Driver* button.
7. Click the *Next* button in the Update Driver wizard.
8. Click the radio button labeled *Display a list of drivers*, then click *Next*.
9. Select the *Have Disk* button.
10. Browse to locate your downloaded driver and install it into your system.





gogogogogogogogogogostop

Motoring along in your business, you drive up to the HP NetServer E 60. *slowdown*

Auto Alert monitors the hard drive, using traffic lights (those fast talkers) to signal its status. *yellow? red?* A quick look informs you what to do to keep things running smooth. Green light. Nothing to worry about. *gogogogogogo*

Continue through the intersection of Friendly and Easy. Give the crossing guard of your peace of mind a nod hello. *go*

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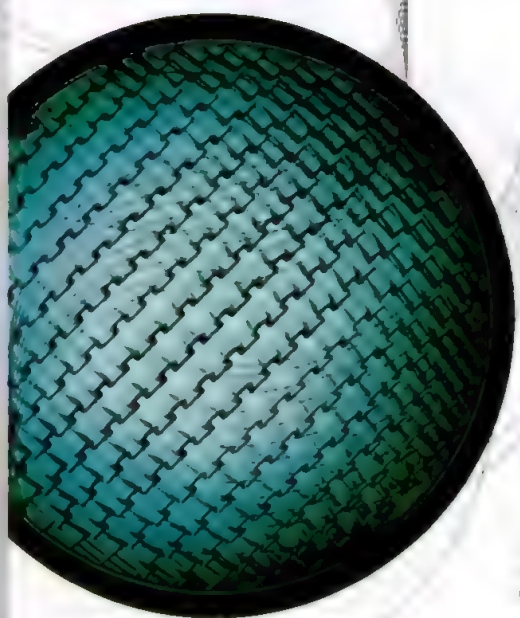

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Spam, Spam, Spam, Spam...

Here's what you can do if junk e-mail is making it hard to separate the wheat from the chaff in your in-box. *By Sheryl Canter*

Imagine getting so much junk e-mail that it takes you 10 minutes each morning just to delete unwanted advertisements from your in-box. This may even cause you to delete messages you really want. You may not have to imagine this; it may already be happening to you.

Unsolicited Bulk E-mail (UBE) is colloquially known as *spam*—lowercase so as not to be confused with the Hormel Foods canned luncheon meat product. The term derives from a famous Monty Python sketch in which a group of Vikings at a restaurant that served only dishes containing Spam sang, "Spam, Spam, Spam, Spam..." with increasing volume until no other conversation was possible. Like the Spam-loving Vikings, e-mail spam threatens to drown out all other conversation. Here we'll explain how spam happens and what you can do to minimize it.

HOW THEY FOUND YOU

Before describing how to get off a spammer's mailing list, let's talk about how to avoid getting on it in the first place. The most common way for spammers to get your e-mail address is through newsgroup posts. Posting to a newsgroup makes your e-mail address available to the world. You could use a fake address, but this prevents people from replying to your posts by e-mail.

One compromise is to post an address like *username[at]myhost.com*, because it defeats automated scanners that look for @ signs but can be edited by humans. Another approach is to append a string to your e-mail address (for example, *No spam!*), and then include instructions in your signature to delete it. Since list vendors can easily program filters for this sort of thing, it will work best if you change your approach frequently.

Filling out Web forms with your e-mail address is another way to make yourself a target for spammers. In general, you should only give out this information at the Web sites of reputable companies. If you want to try a product at an unfamiliar site that requires an e-mail address, enter a fake one.

Some older Web browsers will give your e-mail address to any site that asks for it. To check whether your Web browser does this, visit *www.helie.com/BrowserCheck*.

So-called anonymous FTP is another way you can inadvertently get on a spammer's mailing list. The traditional anonymous log-in is the username "anonymous" and a password that is your e-mail address. Your Web browser or FTP software will enter this information automatically when you access the site. When configuring most FTP software, you can enter a fake e-mail address to be used as the password.

AOL is notorious for the amount of junk mail its customers receive. One source is AOL chat logs; if you participate in the People Connection chat area you are likely to get spammed, so don't use the screen name you use for e-mail in chat rooms. The Member Directory is another rich source of names (complete with a list of interests and other useful data), but deleting your member profile won't help if you are already on the spammers' lists. AOL received so many customer complaints that it instituted a filter feature called PreferredMail that lets you refuse mail from domains known to generate a lot of spam.

Spammers also can use automated mailing lists like Listserv or Listproc to acquire e-mail addresses. Most mailing list software lets you

PC MAGAZINE EDITORS' HOT LINKS

www.pcmag.com/hotlinks

To get started spamproofing your e-mail box and to educate yourself further about spam, visit the following sites. You'll find all of these links on our Web site at the address above.

- **Check your browser**
  http://www.helie.com/BrowserCheck/
- **No junk e-mail lists**
  http://mentalhelp.net/articles/junke.htm
- **How to access full headers**
  http://www.panix.com/help/headers.html
- **Figuring out where to complain**
  http://abuse.net
- **Tools and instructions for analyzing headers**
  http://kryten.eng.monash.edu.au/gspam.html
- **Spam-filtering software**
  http://www.whew.com/spammers/spamtools_filters.shtml
- **Spam legislation**
  http://www.cauce.org/legislation.html

USER TO USER

PC MAGAZINE'S COMMUNITY OF EXPERTS AND READERS

Restoring Auto Disconnect in IE5

Normally, a dialog box appears if your modem is still connected to the Internet and you close Internet Explorer 5. This worked on my computer until I installed some upgrades. Now it doesn't appear anymore. How can I get this feature back?

M. Meighen
Fort Wayne, Indiana

Most likely, your problem was caused by accidentally checking the dialog's *Don't use Auto Disconnect* check box. To turn Auto Disconnect back on:

1. Launch the Internet Options applet from *Control Panel*.

2. Click the *Connections* tab.

3. Select the dial-up connection that you normally use.

4. Click the *Settings* button.

5. Click the *Advanced* button in the Dial-Up settings panel.

6. In the *Advanced Dial-Up* dialog, check the box *Disconnect when connection may no longer be needed*.

—Neil J. Rubenking

A Smarter Cookie Script

I downloaded and installed your neat Cookies.vbs script. When I run it, the first cookie that comes up is "index.dat from www.□0". After *www.* is an upside-down question-mark, a block, and a U with an umlaut. What is this?

Norman Mar
via the Internet

The script (*www.pcmag.com/pctech/content/solutions/in1801c.htm*) published in our issue of January 5, processes every file in the cookies folder. It turns out that this includes the DAT files used to index the cookie text files. The solution is quite simple. In cookies.vbs, find this line:

```
if Not fso.FileExists(fn)
then
```

and replace it with this line:

```
if (fs.Type = "Text
Document") And (Not fso
.FileExists(fn))
then
```

The modified script correctly skips nontext files. *—NJR*

Smart Habits for Slow Connections

Here are two ways to speed browsing: 1. Place the Toggle Images tool from Microsoft in your *Links* toolbar and click it to instantly turn graphics on or off. I leave them off unless absolutely necessary. Click to reload that page with graphics included.

2. Always open two browser windows. To follow a link, do not click it; drag it to the other window. Continue reading while the other page loads. To follow a link in the other page, drag it back to the first window.

Al Lowe

Bellevue, Washington

You'll find the Toggle Images tool in the *www.microsoft.com/Windows/ie/ie40/powertoys/ie4power.exe* collection. Dual browsers can help, even on a fast connection. After opening a link-filled page like a discussion index or search results, keep it open in one browser window. Drag any links to a second window for viewing or right-click them and choose *Open Link in New Window*. —*NJR*

Correct Automation of E-Mail Tasks

The article "Automate Repetitive E-Mail Tasks" (*www.pcmag.com/pctech/content/solutions/in1807b.htm*), in the issue of April 6 was interesting, but some of the advice was not compliant with *www.rfc-editor.org/rfc/rfc2368.txt*, the document that governs mailto: URLs. Specifically:

1. Only one question mark is allowed in a mailto: URL. Subsequent elements should be separated by ampersands.

2. Spaces and certain other special characters should be encoded. *%20* represents a space, while *%0D%0A* represents a new line.

3. Multiple recipients should be separated by commas. Semicolons are not valid separators.

The fact that some mail clients support nonstandard syntax is no reason not to publish the correct syntax.

Jan Musyzinski

Washington, New Jersey

We tested all of the examples in the earlier tip, and they all work correctly under Microsoft's implementation of the mailto: protocol. However, as this reader notes, some of the examples might not work with other browsers. —*NJR*

issue a command to display the names and e-mail addresses of all subscribers to that list. You can also send a command that prevents your address from appearing on these lists.

FIGHTING BACK

It's almost impossible to avoid receiving spam entirely, so what do you do once you've been targeted? Many UBE messages include instructions on how to remove yourself from the list. Unfortunately, unscrupulous spammers use your response as confirmation that your e-mail address is valid and then resell your name to other spammers.

Another approach is to add your name and e-mail address to "no junk e-mail" lists that supposedly are used for suppression. But this is generally ineffective: Spammers usually ignore these lists, and some people have reported an increase in spam after signing up. For an index of such lists, visit the Web site *http://mentalhelp.net/articles/junke.htm*.

Since spammers are well aware that most of their recipients will not be pleased, they rarely use their real return addresses. Temporary accounts are a favorite device. Spammers accept complimentary offers from Internet service providers (ISPs), send out a vast number of unsolicited e-mail messages, and then disappear. Another tactic for spammers is to enter a fake return address in an e-mail program, so hitting the *Reply* button and sending a scathing response will accomplish nothing.

> Hitting the *Reply* button and sending a scathing reponse will often increase the amount of spam you get.

A more effective approach is to complain to the spammer's ISP or, if the spammer is the ISP, then to contact the ISP's connection provider. The goal is to break the spammer's connection to the Internet.

Most service providers dislike spam even more than recipients, because ISPs shoulder most of the costs. Spam uses up vast amounts of disk space, overloads the provider's mail server, and uses up bandwidth. But finding the spammer's ISP or connection provider takes a little research.

The first step in finding the service provider is to look at the full header of the message. If you don't know how to access the full header in your e-mail program, visit the Web site *www.panix.com/help/headers.html*. Note that the information given for Outlook Express is incomplete. To view full header information in that mail reader, right-click on a message and choose *Properties*, select the *Details* page, and click the *Message Source* button.

Analyzing the header information—once you've located it—can be rather complex, depending on the sneakiness of the spammer. The key lines to examine are those that begin with the word *Received:*. E-mail travels from the sender to the receiver by passing through one or more e-mail servers, and each server adds a *Received:* line when forwarding the message to the next server. Many parts of the header can be forged, but the *Received:* line usually can not. For detailed information on how to read the header data, along with tools for using this information to find the spammer, visit *http://kryten.eng.monash.edu.au/gspam.html*.

Once you figure out the domain that should receive the complaint, you then need to identify the e-mail address. Usually *postmaster* will do. Some domains have the e-mail address *abuse* set up for this purpose. Compose a polite e-mail message, stating why you object to the message, and include a copy of the offending message with full header information. Alternatively, you can use the forwarding service at *http://abuse.net*.

If all this sounds too difficult, automate the process with software. In our September 1 issue, you'll find reviews of 11 spam-filtering programs in the "Stop Junk Mail" section of "Protect Your PC (& Your Privacy)." For another list of products, visit the AntiSpam Campaign Web site at *www.whew.com/spammers/spamtools_filters.shtml*. Some of these products identify spam by comparing the return address to a list of known spammers—the same approach used by AOL. Others, such as SpamKiller (winner of *PC Magazine*'s Shareware Award for 1999 and Editors' Choice in the feature article just mentioned), use more complex filters that analyze many parts of the header and the message content. (For more on SpamKiller, visit *www.pcmag.com/downloads/awards*.)

State and federal lawmakers have been arguing about how to control spam for several years now. You can find the latest news on pending legislation at the Web site of the Coalition Against Unsolicited Commercial E-mail at *www.cauce.org/legislation.html*. But to date, we're on our own. Unless the spammer is breaking some existing law (for example, pornography or fraud), we have no legal recourse. All we can do is find effective ways to complain. PC

Sheryl Canter is a contributing editor of PC Magazine.

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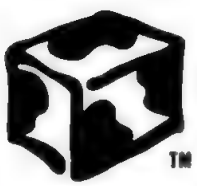

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- 17X min/40X max CD-ROM Drive
- 3.5" Diskette Drive
- Integrated 3Com® US Robotics®10/100 Ethernet with Wake-up On LAN
- 5-Bay Convertible Case
- 104+ Keyboard
- MS IntelliMouse & Mouse Pad
- MS Windows 95
- Wired for Management (WfM) Compliant
- Intel LANDesk Client Manager 3.31
- **3-Year Parts Limited Warranty with 3-Year On-site Service[1]**

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E-4200 500 Outstanding Performer

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- 7-Bay Mid-Tower Case
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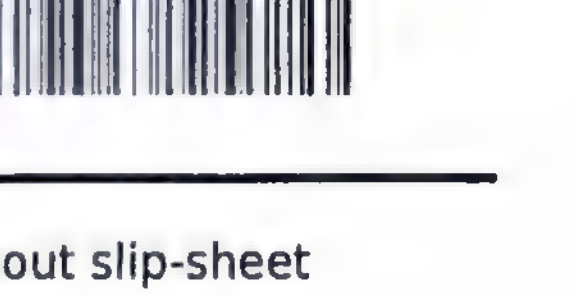
Folded edge of the page

Foldout slip-sheet

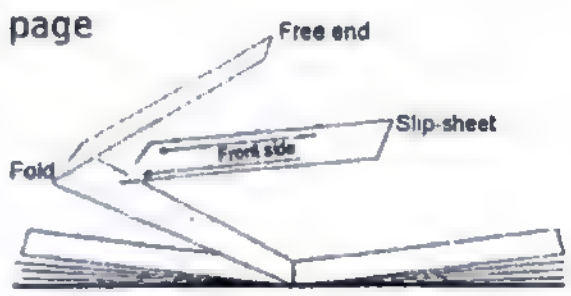
1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



GbsSlipSheet-001

Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Inverted Back

1. Follow instructions on the other side

Back

1. Follow instructions on the other side

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PC World's Top 100 Solo 5150LS #2 Top 5 Power Notebooks - June 1999

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Word 2000 Peeves

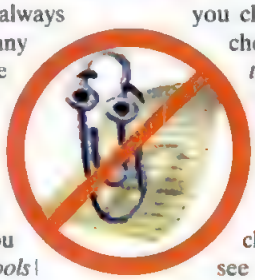
The new version of Microsoft's word processor offers many features—and some you'll want to live without. *By M. David Stone*

Microsoft Word 2000 includes "usability" features that are supposed to make Word easier to use. But for many users, these features can be more annoying than helpful.

Here's a survival guide to help you take advantage of them, modify them, or turn them off.

SWITCHING MENUS

The short menus may seem less overwhelming to new users, but experienced users often want access to all commands. Getting them requires an extra step—either hitting Ctrl-<Down Arrow>, choosing the *Expand* arrow at the bottom of each menu, or clicking on the menu name a second time. Another source of confusion is that the short menus aren't always the same. They're personalized—any command you use will appear on the menu next time you pull it down. This can get confusing if you work on more than one computer or share a computer with others.



If you prefer seeing the full menus all the time, here's how you can change this behavior. Choose *Tools | Customize*, then *Options*. To turn off personalized menus, uncheck the box labeled *Menus show recently used commands first.*

You'll also see a check box labeled *Show full menus after a short delay.* This is available only when you have Word set to use personalized menus. Note: Whatever setting you use will apply to all other Office 2000 programs.

FIXING THE TOOLBARS

The default of Standard and Formatting toolbars on one row provides more room vertically for your document. But even at high resolutions, there isn't enough room for both toolbars to fit across the screen. You have to expand the toolbars with the *More Buttons* button at the extreme right of each toolbar.

One fix is to tell Word to place each toolbar in its own row: Choose *Tools | Customize*, then *Options*, and remove the check from the check box labeled *Standard and Formatting toolbars share one row.* Changing this option in one Office program will not affect other Office programs.

You can sidestep this issue by manually choosing the buttons displayed. To see a complete list of buttons, choose the *More Buttons* button for that toolbar, then choose *Add or Remove Buttons*. This list will show check boxes for each available toolbar button.

KILLING OFF CLIPPY

Another hard-to-miss feature is the new, 3-D version of the Office Assistant—Clippy the paper clip by default—with even more distracting animation than in Word 97. Worse, a cursory look at the *Help* menu seems to indicate that the Office Assistant is the only route to help, as the *Contents and Index* choice is gone.

Fortunately, this first impression is wrong. Microsoft has gotten the message that a lot of users don't like the Office Assistant. In Word 2000, it's easy to get rid of the clip altogether. If you click on the Office Assistant and choose *Options*, then click the *Options* tab, you'll see a list of features you can turn on or off. The check box that matters most is at the top of the dialog box and is labeled *Use the Office Assistant.*

Remove the check from this box, choose *OK*, and you'll never have to see Clippy again. Should you later decide you want the Assistant back, choose *Help | Show the Office Assistant.*

OTHER DISTRACTIONS

To keep Word from adding wiggly lines under what it thinks are misspellings and errors in grammar, choose *Tools | Options*, then *Spelling and Grammar*, and remove the checks from the *Check spelling as you type* and *Check grammar as you type* check boxes.

To keep Word from changing formats—by automatically formatting short paragraphs as headings and converting text to bulleted or numbered lists—choose *Format | AutoFormat*, then *Options*, then *AutoFormat as you type*, and remove the checks from any of the options that you find more troublesome than helpful.

Finally, if Word constantly surprises you by changing the indention for a paragraph when you hit Tab or Backspace, choose *Tools | Options*, then *Edit*, look in the area labeled *Editing Options*, and remove the check from the *Tabs and Backspace set left indent* check box. PC

M. David Stone is a contributing editor of PC Magazine.

USER TO USER

PC MAGAZINE'S COMMUNITY OF EXPERTS AND READERS

Increase or Decrease Font Size in Word

To adjust the font size in Microsoft Word quickly, select the text you want to change and hit Ctrl-> (that's Control-Shift-<Period key>) to make it larger or Ctrl-< to make it smaller. For Word 7, Word 97, and Word 2000, the size will change by 1 point size per keystroke in the range of 1 to 12 points, 2 point sizes per keystroke from 12 to 28 points, and larger jumps for still larger point sizes.

You can also use this trick on a whole word without first selecting the word. In Word 7 and Word 97, place the cursor anywhere in the word and press the key combination. In Word 2000, choose *Tools|Options*, then *Edit*, and make sure there's a check in the *When selecting, automatically select entire word* check box. If the box is not checked in Word 2000, the command will affect only the font size of characters you type at the cursor.—*MDS*

Closing All Open Files at Once In Word and Excel

I often work with several files open in Word. Having to close each one individually when I'm done is a minor chore. Is there a way to close them all at once?

James Douglas
North Plainfield, New Jersey

Actually, Word (and Excel, for that matter) has a *Close All* command. To see the command in Word 97 or 2000 (or Excel 97 or 2000), either hold the Shift key down when you click on *File*, or hit Alt to move to the menu bar then Shift-F to open the *File* menu. Either way, Word (and Excel) will replace the Close menu item on the *File* menu with *Close All.*

You can add the *Close All* command to the File menu permanently in Word 97 or Word 2000. Choose *Tools | Customize*, then *Commands*. In the *Categories* list box highlight *File*, and browse though the *Commands* list for *Close All*. Drag the *Close All* command up to the *File* menu. Word will open the menu so you can drag it. As you do so, you'll see the current position represented by a line across the menu. Drop the command where you want it by releasing the mouse button, then choose *Close* to close the *Customize* dialog box.—*MDS*

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Long-Distance Printing

Remote printing becomes a reality with the Internet Printing Protocol. *By Alfred Poor*

You get back to your hotel room after a long day of negotiations and put the finishing touches on your report, complete with photos and diagrams covering important details for the project. You want to wrap everything up with a decision tomorrow, but you need approval from your home office as well as a partner company. How will you get your report into everyone's hands when they come to work in the morning?

The standby for American business in this situation has been the fax. "Print to fax" is now commonplace. All you need is a phone line, but you may well be making long-distance calls to a number of recipients, and your carefully crafted report will be reduced to 200-dpi black-and-white pages. Sure, you could print the report in your hotel (if it has a business center) and send the copies out by overnight courier (if it's not too late), but the expense will make the long-distance fax calls look like bargains.

What if you could log onto the Internet, locate available printers with your browser, and have your word processor send the job directly to the printers in the offices of your recipients? No long-distance calls required, and your report comes out in full resolution—even in color, if the destination printer supports it. That's exactly what the Internet Printing Protocol (IPP) promises.

IPP can help with other types of print jobs as well, those that are typically relegated to fax or courier. Broadcast documents—such as price lists that are issued to branch offices or newsletters distributed to clients—can be sent quickly and inexpensively. And the technology works on any network that relies on TCP/IP, so you can use the same solution on your local area network or your intranet as easily as on the Internet. You use the same process to send your print job down the hall or across the country.

How Web Printing Works

IPP specifies a list of printer capabilities and print job commands and defines the interaction between client, server, and printer. With this protocol, you can access remote printers from your browser.

SIMPLIFIED SOLUTION

Interest in creating a single standard for printing on the Internet led to the creation of the IPP Working Group (IPP-WG) in March of 1997, under the auspices of the Internet Engineering Task Force (IETF). The participation of major players—including Hewlett-Packard, IBM, Lexmark, Microsoft, and Xerox—meant that the resulting standard had a good chance for broad implementation and acceptance.

One of the problems with local area network printing has been the variety of hardware and software solutions. Printers can be attached to client workstations or to a file server, a dedicated server, or even directly to the network. Print jobs may be spooled on a server or sent directly to the printer on a peer-to-peer basis, relying on a variety of protocols and running under a variety of operating systems. To resolve such differences, a primary goal of the IPP-WG was to use "off the shelf" solutions as much as possible. A further objective was to enable users to interact with printers in real time, so that in addition to submitting print jobs, users could also find out about the target printer's capabilities, inquire about the status of a job, or cancel a job that had been submitted.

Some early attempts at Internet printing relied on e-mail protocols, sending the print job as a Multipurpose Internet Mail Extension (MIME) attachment to a message addressed to the printer. This approach met the need for using common tools but did not support interactive features. In fact, there was no way to be certain that the message was ever received.

The IPP-WG settled on a client-server model instead, using two types of objects: printers and jobs. The client sends a print job request to a printer object via the server, and then the print-

Flaky Eject Button

My CD-ROM drive button is flaky. Sometimes it works, sometimes it doesn't work. What can I do?

Jack North
via the Internet

Under Windows 95 and Windows 98, a temporary failure of the CD-ROM eject button when you want to insert or remove a program or data disk is not at all uncommon. One solution is to close all applications and restart your computer, after which the eject button will most likely respond. If you don't want to take the time to restart, you can often circumvent the problem by opening the Windows CD Player application. Click *Start | Programs | Accessories | Entertainment | CD Player*. You won't harm anything by starting the player with a data disk installed, and when you click the eject button on CD Player's console, in most cases the drive tray will slide out. If you didn't install the CD Player on your PC because you never intended to play audio disks, you'll need to run Windows Setup from the original operating system CDs to install the application, so it's a good idea to install the program before you have a problem. —*Bruce Brown*

Seeing Clearly

Servicing or upgrading a PC is a usually a one-person task, but it's often made more difficult because you need three hands: one to hold a screw or component; one to hold a tool, such as a screwdriver, or to push the component into place; and one to hold a flashlight so you can see what you're doing in the cramped space inside the computer. The most convenient solution is to wear a headlamp, the type sold by outdoor-equipment supply stores, catalogs, or online shopping sites such as *www.llbean.com* or *www.shopems.com*. Headlamps have an elastic strap to hold the light on your head, and most models have variable-focus lenses. You won't make much of a fashion statement wearing a headlight, but it works well for computer maintenance, does double-duty for reading in bed or on a dark airplane or train, and can even be used when hiking, if you ever get outdoors. —*BB*

Fixing Monitor Flicker

The image on my computer screen seems to flicker. Is there anything I can do?

Ann Fielding
New York, New York

Flickering images can be distracting and tiring. If your graphics adapter's vertical refresh rate is set below 75 Hz, it's too low—even if you don't notice the flicker. To check, look slightly to the left or right of your monitor: Your peripheral vision is better for detecting flicker. Vertical refresh rate is controlled by your graphics adapter and is limited by the specified rate your monitor supports. These settings should be accessible via *Start* | *Settings* | *Control Panel* | *Display Adapter* | *Settings*, although some graphics adapters include taskbar utilities that let you change display properties. Many graphics adapters and monitors support very high vertical refresh rates, but there's no user benefit in setting the rate higher than 85 Hz. In fact, higher settings will make your graphics adapter or system processor run unnecessary cycles, which affects overall system response.—*BB*

One at a Time

When I try to run our videoconferencing software, sometimes all I get is a blank screen. Can you tell me why that happens?

George Evans
via the Internet

Many video and videoconferencing applications can access only a video camera resource that is not shared by any other application. Microsoft NetMeeting, for example, is unable to find a correctly installed and perfectly functioning video camera that's in use by another program, and it displays a blank screen. If you load your video camera's self-monitoring screen before starting NetMeeting, the software can't find the camera because the system resource has already been allocated to the monitoring program. So if you get a blank screen (assuming that all cables are attached correctly—the usual culprit for hardware malfunctions), be sure to check that all monitoring programs and other video applications are closed.—BB

er object creates a job object that the client can interact with to monitor its status or cancel it. The client can also interact with the printer object to query the printer's capabilities and status.

To simplify the design, IPP transfers are made using HyperText Transfer Protocol (HTTP)—the same system used by all Web browsers. The decision to rely on HTTP 1.1 was made because this version supports persistent connections. This means that once a connection is made to a server, multiple commands (and multiple files) can be transmitted over the single Transmission Control Protocol (TCP) connection.

Using HTTP also makes good sense because it has already been implemented in many printers designed for network use. The Simple Network Management Protocol (SNMP) is designed in part to support remote management of printers, and many manufactures have built Web-server features right into their printers. As a result, all you need is the printer's TCP/IP address, and you can access the printer's configuration controls and status information using any browser.

In a similar way, IPP lets you send a print job to a printer across a TCP/IP connection. The printer can be attached to a server, or it can be connected directly to a network and fulfill the server functions itself.

> The participation of major players meant IPP was likely to be widely accepted.

IPP is still in the early stages of implementation. The IPP-WG held two "bake-offs" to test printers and clients on different operating systems for interoperability under this standard. While results for the second bake-off are not yet available, the first was a resounding success. Held in September, 1998, it included 16 companies representing printer manufacturers, operating system developers, and others. Printing of simple jobs was 96.9 percent successful.

A number of printer manufacturers have issued prototype clients—IBM and Xerox have Java-based versions available for downloading from their Web sites. Microsoft also is building IPP support into Windows 2000.

SECURITY ISSUES

A number of details remain to be ironed out in IPP, not the least of which concern security. One type of problem involves the relationship between the client and the printer. If both are on the same network—behind a firewall if connected to a larger network or the Internet—then there is little security risk in the transfer of print jobs. If the client is behind a firewall and needs to send to a printer that is not behind a firewall, then there is no problem in effecting the transfer (aside from the fact that this arrangement may leave the printer open to "spam" print jobs similar to "junk" faxes). But if the printer is behind a firewall with the client outside, there is a significant problem in how to establish direct communication with the printer and to validate both ends of the connection. The answer may well be to set up a port through the firewall that will allow only IPP transmissions, and only with a specific IPP server.

Related to this is the issue of securing job transmissions across a public network. At present, IPP relies on the Secure Sockets Layer (SSL) standard, a widely used protocol for protecting transmissions on Web sites, though the IETF is considering a new security standard, Transport Level Security (TLS), which will be compatible with SSL.

Even if the external security issues are resolved, you may well not want everything you send from the field visible to whoever wanders over to the printer in your office. Different print jobs have different security requirements. Sending a draft press release to a remote printer probably doesn't require the same safeguards as printing paychecks or contracts remotely. A number of approaches are being considered to address this problem, including password protection for the document at the printer; an operator would have to enter a password on the printer's control panel in order to release the job for printing.

Other details remain to be worked out, including how and where to maintain directory services for IPP printers so that users can locate printers that are available to them. Also, a "universal" printer driver is under consideration so that the client does not have to have a printer driver installed for every remote printer. As an interim solution, Windows 2000 includes a feature that lets the IPP server send the client the necessary driver, which will be installed automatically, before the client's print job is transmitted.

IPP is just getting underway, but just as the Internet has changed so much about the way we access and transfer information, this new standard may revolutionize the way we connect to our printers and distribute documents all over the world. PC

Alfred Poor is a contributing editor of PC Magazine.

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Protect Your Vital Data

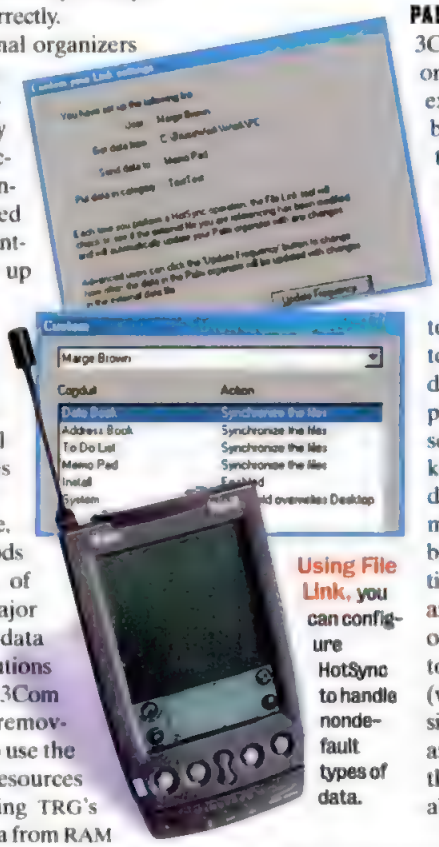
You can't afford to lose the data in your PDA. Here's how you can make sure it's safe. *By Bruce and Marge Brown*

Personal Digital Appliances cost relatively little to purchase; their real value accrues as you enter your personal and business information. If you lose the data on your PDA—say, someone steals the device, you misplace it, the batteries run down, or it gets damaged—the costs in time, aggravation, and lost opportunity can be horrifying. Before entering data you can't afford to lose, you need to know how to make backups. The good news is that there are several ways to back up PDA data, either when you're connected to a host PC or when you're remote, or hostless. Like any backup procedure, however, these methods will protect you only if you use them, and use them correctly.

3Com Corp.'s Palm personal organizers and the Microsoft Windows CE PDAs from various vendors can link to host PCs by cable or infrared serial connection, modem, or network to synchronize the information stored in PDA contact, task, and appointment databases and to back up other significant data. Synchronizing your PDA with a PC before you head out for an appointment or business trip should be a strict routine to protect your data as well as to ensure that both devices are up to date.

When you can't synchronize, independent storage methods become your prime means of data protection. The two major PDA device families differ in data storage; therefore backup solutions on the road differ as well. The 3Com Palm devices don't support removable storage, so you'll need to use the available internal memory resources creatively—for example, using TRG's FlashPro software to copy data from RAM to ROM so it won't disappear if your batteries fail or if your primary files are corrupted. There's no protection if your device is lost or stolen, however. Hand-held (H/PC) and palm-size (P/PC) Windows CE PDAs have slots for PCMCIA (PC Card) and CompactFlash (CF) removable memory cards. Using system or backup utilities, you can copy vital information onto one or more memory cards to restore corrupted files easily or even recover from a lost or damaged device by loading the backup files on a replacement PDA.

Because making backups is often considered an aggravating waste of time, any successful backup solution has to be reliable, relatively fast, and extremely easy to use. Lots of people are lax in backing up PCs, but when PDA data can fall victim to disasters ranging from dead batteries to theft to being dropped into water or sat upon, people who value their personal information need to commit to backing it up.



Using File Link, you can configure HotSync to handle nondefault types of data.

PALM PDAS

3Com's Palm personal organizers have been extremely successful because they are easy to use and fast. By using HotSync technology to make synchronization between a PDA and a host PC as simple as touching a single button on a Palm device's docking cradle, the platform's developers served two causes: keeping host and PDA data up to date and making automatic data backups. Two limitations to easy data archiving are the type of data that can be automatically backed up (which, by default, consists of PIM, Memo Pad, and Expense data) and the absence of removable storage media.

Fortunately there are relatively easy ways to cope with both limitations: the first, via careful HotSync configuration; the second, by using an inexpensive memory utility. The downside is that each method of data protection requires Palm users to delve a bit deeper than the device defaults—an objection that is answered handily as stored data becomes more valuable.

USER TO USER

Protect Your Notebook Modem

Is there any way to tell whether a modem jack in a hotel is safe for connecting a laptop's modem? I've heard that the wrong kind of jack can damage your hardware.

Joseph Galvin,
Smithtown, Long Island

Two small gadgets—line testers and digital line adapters—can help you find a live telephone line as well as protect your modem from damage by digital phone lines.

Inexpensive telephone line testers (under $10 and available from many retailers, including RadioShack) can help you determine whether a phone jack is live and properly wired. When you plug a line tester into an RJ-11 jack, a green light means the line is fine, a red light means the line is live but cross-wired (it probably still works), and no light means the jack is not active.

HelloDirect (800-444-3556, *www.hello-direct.com*) sells LineStein ($120 direct), a digital adapter that lets you use an analog modem on digital phone lines without threat of damage to the modem. When plugged into a digital phone, LineStein automatically analyzes the phone system and adapts your transmissions for maximum effectiveness.—*BB*

Traveling Convenience

If you often synchronize a PDA with more than one computer, buying an extra docking cradle can save travel bag clutter. One typical scenario is connecting a PDA with one PC in the office and another at home. If you keep docking cradles at both locations, you can easily keep the two PCs and the PDA up to date without carrying a bulky cradle back and forth. An extra cradle in the office (and at home) can also be passed around or shared by multiple users. For PDA users who travel frequently, some PDAs can synchronize via proprietary serial cables that take up less space in a travel bag than a docking cradle.—*BB*

Better Batteries for PDAs

Most PDAs either come with or will run on rechargeable batteries instead of disposable cells. Lithium ion and nickel hydride batteries give the longest battery life and don't have the significant

decreasing-charge memory effect of nickel cadmium batteries.

Three or more extra sets of rechargeable batteries are ideal: one set in the device; one set in your mobile case; and one at your workstation or travel base. Portable battery chargers are ideal for travelers. To avoid confusion, use distinctively marked or colored containers to hold depleted and fully charged batteries.—*BB*

Extending Battery Life

Most PDAs have user-adjustable settings that can significantly extend battery life. The greatest battery drain is screen backlighting. Whenever possible, don't turn the backlight on. If you do need the backlight, set the brightness to the minimum level necessary for comfortable use. Some devices let you set different brightness-level defaults for operation on AC or battery power; in this case set the brightness lower for battery operation. Some devices let you set the number of seconds of idle time before the backlight dims. And all Windows CE and Palm personal organizers will automatically go into suspend mode after some period of inactivity. For the longest battery life, set the inactivity backlight dimming or suspend mode settings to short intervals.—*BB*

The Two-Way Paging Advantage

I've been reading about the new two-way pagers and I wonder if they're worth the extra up-front cost?

Charles Rudesill,
Jackson Heights, New York

Two-way paging lets you answer pages immediately and ensures that you receive messages by sending an acknowledgment to the paging system. But another, lesser-known advantage is that two-way paging can be less expensive than one-way paging for frequent users. If you only receive a few pages a day and stay within your home region, two-way paging probably won't save you money, but nationwide two-way paging can be much less expensive than one-way paging if you receive lots of pages.

Because two-way paging systems know where you are, thanks to a periodic locating signal sent out by the pager,

BACKING UP TO A PC

When you first install the Palm Desktop software, the default configuration setting is to synchronize all the files in the respective PC and Palm PDA Mail, Date Book, Address Book, To Do List, Memo Pad, and Expense applications. For each application you can choose to have the PDA data overwrite the PC data, PC overwrite PDA, do nothing, or stick with synchronizing the files. The last choice enables you to travel with your PDA, secure that if the worst happens and your device is lost, you can copy the last HotSync session's data onto a replacement PDA.

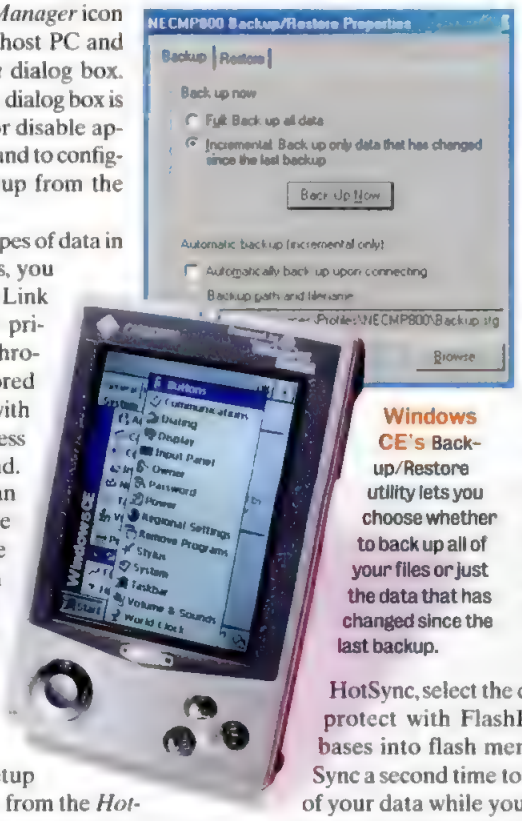
You can change the HotSync setup by clicking on the *HotSync Manager* icon on the taskbar on a host PC and opening the *Custom* dialog box. Note that the *Custom* dialog box is the place to enable or disable application installation and to configure system file backup from the PDA to the PC.

To include other types of data in the HotSync process, you can use Palm's File Link feature. File Link is primarily used to synchronize external data stored on a PC or network with the Palm PDA's Address Book or Memo Pad. External files that can be selected for the File Link feature must be in one of four data formats: comma-separated (CSV), Memo Pad archive (MPA), Address Book archive (ABA), or text (TXT). You start the File Link setup wizard by selecting it from the *HotSync Manager* menu on the host PC, choosing whether to store the data in the Address Book or Memo Pad, browsing for the external data file location, and then selecting the file type and filename.

After you've created a File Link, you can determine how often to check the original external source for changes or updates. The HotSync Manager stores copies of data synchronized by File Links in separate categories (which you name) on both the PC and PDA.

INDEPENDENT BACKUPS

With no removable storage technology for Palm PDAs, you're left on your own, but TRG Products' FlashPro ($30 street price, 515-252-7522, *www.superpilot.com*) is a cost-effective solution for backups that for most users will also free up extra memory. Palm PDAs don't use all of the available flash memory in the devices. FlashPro, which requires Palm OS 3.0 or later on the Palm device and Windows 95/98 or NT 4.0 or later on a host PC for installation, enables the use of 800K of otherwise unused flash memory on the Palm PDA. The enabled flash memory can be used to transfer flash-compatible applications from RAM to flash memory and, for backups, moves read-only database copies from RAM to flash memory. (Note that the FlashPro program is not compatible with the newest Palm PDA, the IIIe.) You cannot read data stored in flash memory by FlashPro. For example, if you move your contact database to flash, you'll need to move it back into RAM to read it, since the Palm Address Book can't read flash data. But moving data between memory types is an easy, two-tap process.



Windows CE's Backup/Restore utility lets you choose whether to back up all of your files or just the data that has changed since the last backup.

A more efficient way to use the program is to do a double HotSync each evening or morning when you connect to a host PC. After the first complete HotSync, select the databases you wish to protect with FlashPro, move the databases into flash memory, and then HotSync a second time to have a working copy of your data while you're traveling. If your data goes bad during the day, you should be able to move the backup copy from flash to RAM to keep on going. You can continue to update, read, and protect your data during the day by moving it in and out of flash, a simple and speedy process.

WINDOWS CE PDAS

Although some PDA users decry Microsoft's Windows CE for its relatively cluttered interface and for slow performance with PIM databases, the extra features in the operating system and the added capabilities of the H/PC and P/PC PDAs pay off in functionality. In addition to the standard synchronization software features used to keep the PDA Pocket Outlook Contacts,

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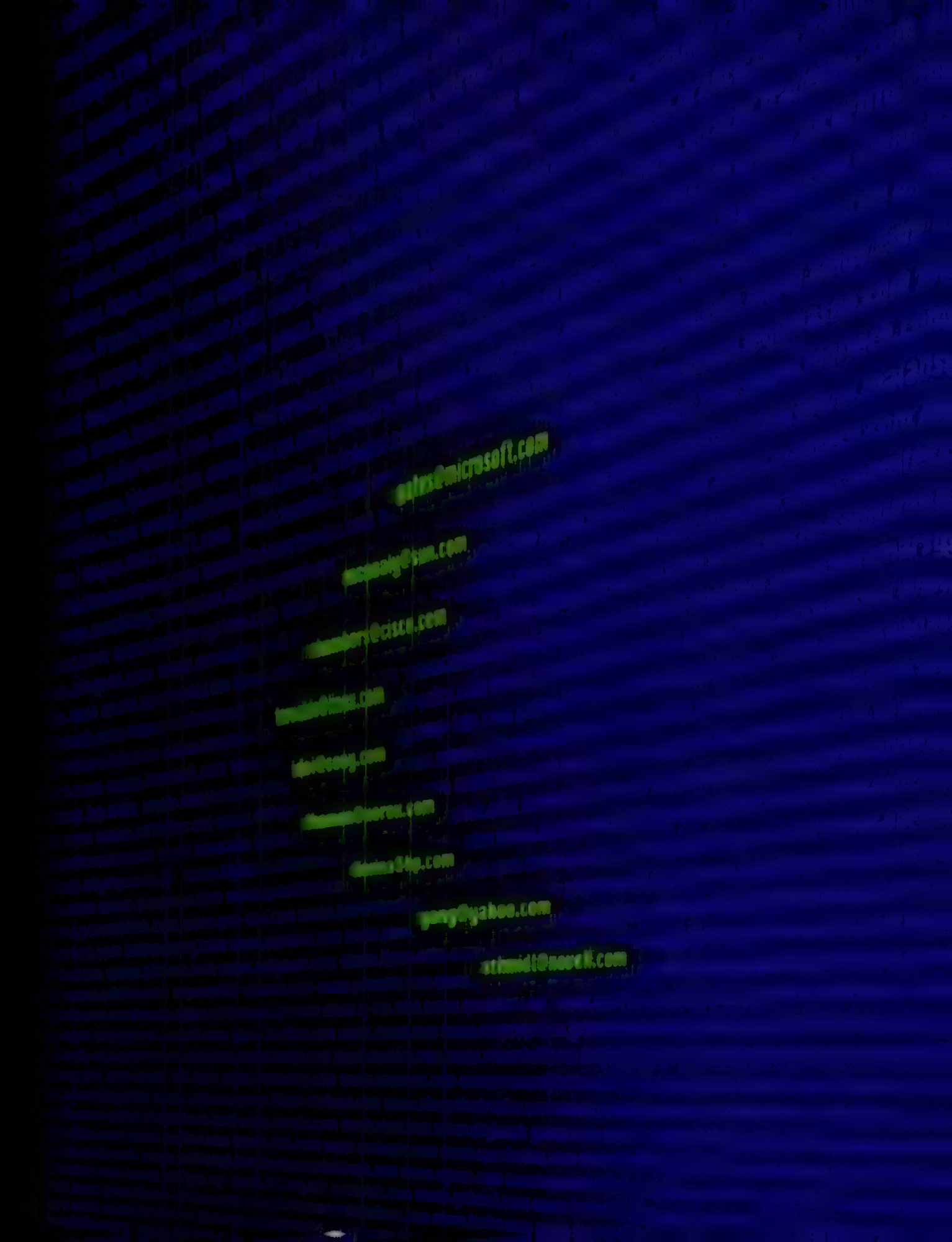
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the system only has to transmit a new page to your last known location, not to the whole country—a significant cost decrease to the paging service that you should look for in your rate plan.—*BB*

Powerful Protection

If you travel with a notebook, PDA, or other mobile device, make it a priority to include a small surge protector in your travel bag. If you often find that you run out of AC outlets in hotel rooms or offices, a power strip with surge-protected AC sockets can provide extra outlets as well as a first line of power protection. Be sure to buy a unit with protection for modem jacks as well. American Power Conversion Corp.'s (800-877-4080, *www.apcc.com*) SurgeArrest Notebook surge protector ($30 street) plugs in-line between the notebook AC adapter and the wall outlet to protect against power surges and adds modem protection with three phone jacks.—*BB*

Made in the Shade

If you've ever tried to use a notebook computer (or most PDAs) outside, you know that LCD screen images that look bright and clear under room lighting are difficult to see in sunlight. The reflective, color TFT screens used in Compaq and Everex palm-size PCs are optimized for viewing in sunlight, but most other displays are nearly impossible to see in natural light, including while traveling in vehicles. If your dream of answering e-mail or surfing the Web while sitting on the beach seems in jeopardy, fear not, for a relatively simple solution is at hand: Use a sunshade. You can make your own display sunshade using dark, non-reflective material that extends over the top and both sides of your display and attaches with Velcro strips, or buy a commercial product such as The Adjustable Notebook Visor from a2z Mobile Office Solutions($27.95 direct, *www.a2zsolutions.com*).—*BB*

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Appointments, Tasks, Messages, Channel Items, and Synchronized Files up to date, Windows CE also has a Backup/Restore function that performs similarly to a desktop backup program. For quick backups in the field and to reload a new PDA with a full set of data, flash memory cards are a major advantage.

BACKING UP TO A PC

Windows CE Services, the program installed on a host PC, features several methods of transferring data between the PC and PDAs, including synchronization, file copying, and a Backup/Restore utility. Unlike Palm's HotSync feature, which requires that you press a button or click on an icon to start synchronization, Windows CE active synchronization monitors both the PDA and host PC while the devices are connected and can, if you choose, automatically update both devices whenever a change is made on either. You can also select any file for synchronization, although programs and data from one platform can't be loaded and run on the other device without a conversion process, such as the conversion between Microsoft Word and Pocket Word that's standard with Windows CE H/PCs such as the NEC MobilePro 800. You can also copy files and folders between a Windows CE device and a host PC by dragging and dropping between the Mobile Device window, configured when you install Window CE Services on the PC, and Windows Explorer. For more complete data and application protection, however, the Backup/Restore utility is the best answer.

> For quick backups, removable flash memory is a major advantage.

The Backup/Restore utility is accessed via the *Mobile Devices* window. With the window open, click *Tools* and then click *Backup*. The *Backup properties* dialog box that opens lets you select whether to perform a Full backup of data (which includes all files, Pocket Outlook data, and RAM-based programs on the PDA) or an Incremental backup of data changed since the last backup.

You can also choose whether to have Windows CE Services run the Backup utility each time a PDA is connected to the host PC or only on command. In addition, you can specify the path and filename of the backup file, which potentially lets you move the file to another host PC in order to restore your PDA—helpful if you are traveling and need to have the file e-mailed to you for restoring on another, temporary, host PC. One caveat is that the backup file is not password-protected even if you used passwords on the PDA; the answer is to use PC password or encryption software to protect your data.

INDEPENDENT BACKUPS

One of the best features of the Windows CE platform is the inclusion of multipurpose removable card slots. Most H/PCs have both a Type II PC Card slot and a Type II CF card slot, while P/PCs have a CF card slot. The card slots can be used for modems, network cards, and removable flash memory cards. By using a removable memory card, you can make fast, multiple data backups to protect against corrupted files on the PDA and against a lost, stolen, or damaged device. It's wise to carry at least one current, backed-up memory card in a different case or bag than the one in which you carry your PDA unit.

CompactFlash cards, the more common and less expensive of the two, are currently available for approximately $100 for a 48MB card, more than enough storage to back up any Windows CE device on the market. An advantage for central purchasing departments is that CF cards can be used with both Windows CE H/PCs and P/PCs, as well as in many digital cameras; a downside is the relatively small size of CF cards, which makes them easy to misplace.

With a removable memory card installed on a Windows CE PDA, the way to back up data when you're remote from a host PC varies depending on the type of CE device you're using. With H/PCs like the IBM WorkPad z50 or the Vadem Clio, you can use the PDA's Windows Explorer to drag and drop files and folders in a manner similar to using Windows Explorer on a desktop PC. Most but not all of the Palm-size PCs, including the Casio E-100, Compaq Aero 2100, and HP Jornada 420, are bundled with a separate CF backup utility. The Casio Card Backup program, for example, backs up all user data in memory onto a CF card. Note that with this utility you cannot keep multiple backup files on a single card, because the process replaces the previous backup; with multiple cards, however, you could make duplicate or periodic backups.

As you can see, protecting the real value of your PDA—the data you store in it—is relatively simple. The important thing is to choose one of the methods and then use it regularly. PC

Bruce Brown is a contributing editor of PC Magazine. *Marge Brown is a frequent contributor.*

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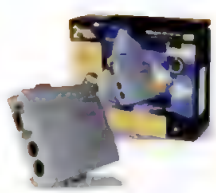

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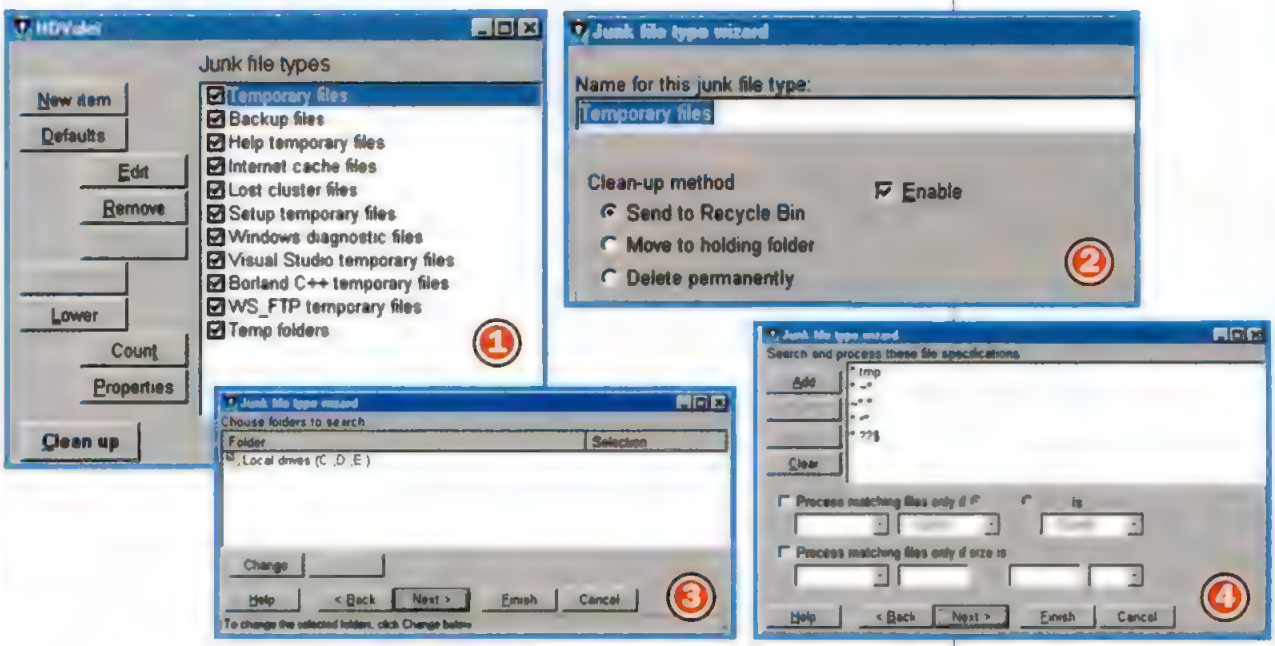
HDValet finds and removes all of the unnecessary, space-wasting files on your system. *By Neil J. Rubenking*



The more you use your computer, the more your hard disk becomes cluttered with junk files that take up space and serve no useful purpose. For example, many programs save previous versions of documents with the extension .bak. ScanDisk can leave files with the .chk extension in the root folder of any drive, and these files are very rarely useful. Cache directories are often filled with files meant to speed access to Internet sites you will never revisit. It's time-consuming to delete these junk files manually, and you may not even know where to look for them.

This issue's utility, **HDValet**, automates the process. Just select the junk file types you want to eliminate and click the Clean up button. The list of junk file types is configurable, and you can add to it as needed. A confirmation process protects against mistakes.

HDValet runs under Windows 95, Windows 98, and Windows NT 4. An article about how to use HDValet and how it was written is available on our Web site at *www.pcmag.com/utilities*. A link to download the utility and its Delphi 4 source code can also be found there.

1. HDValet's main window displays a configurable list of junk file types. Click the *New Item* button to add a new type.

2. A wizard helps you add or edit junk file types. On the first page, you enter the name of the type and specify a *Clean-up method*.

3. On the second screen of the wizard, you choose which drives to search for this junk file type. Here, all local drives will be searched.

4. Next you list the junk file type file specifications. You can also specify the file date, age, and size on this page. The final page is similar to this one and lets you specify files that should be protected from deletion.

HOW TO GET THE FILES

PC Magazine *utilities and other Solutions files are available on the Internet and by mail.*

Via the Internet: Go to the *PC Magazine* home page at *www.pcmag.com* and click on *Downloads*, or use our FTP server at *ftp.zdnet.com/pcmag*.

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Support: To obtain help for *PC Magazine*'s free utilities, visit our online discussion area on the Internet (*www.pcmag.com/utilities/support.html*)

Neil J. Rubenking, the author of HDValet, is contributing technical editor of PC Magazine. *Sheryl Canter is the editor of the Utilities column and a contributing editor of* PC Magazine.

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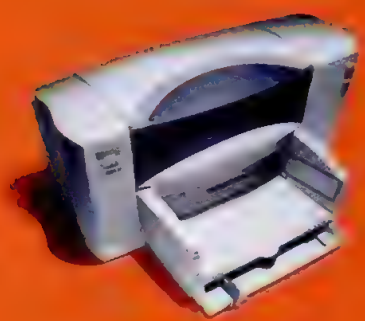

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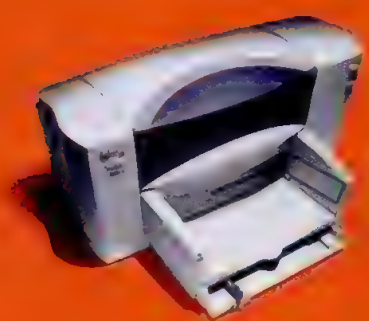

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40X	Toshiba	XM6602B	85	$57
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40X	NEC	CDR3010	85	$85
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40X	Plextor	PX40TS	85	$110
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9.1GB	10,000	Seagate	ST39103LC	$545
18.2GB	7200	Seagate	ST318275LC	$670
18.2GB	7200	Quantum	KN318200SCA	$599
18.2GB	10,000	Seagate	ST318203LC	$885
18.2GB	10,000	Quantum	TN318200SCA	$775
36.4GB	7200	Seagate	ST136475LC	$1199
36.4GB	7200	Quantum	KN336400SCA	$1125
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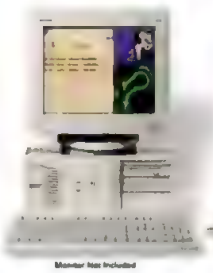

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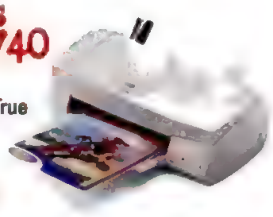

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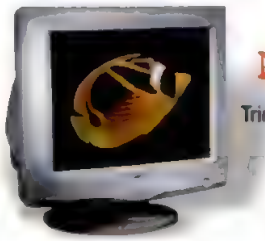

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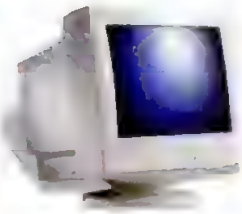

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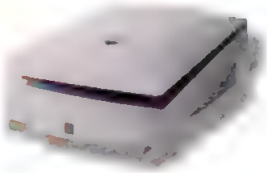

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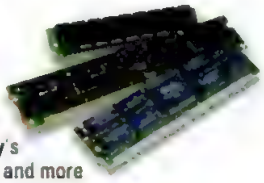

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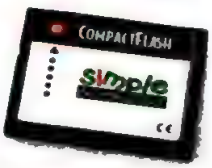

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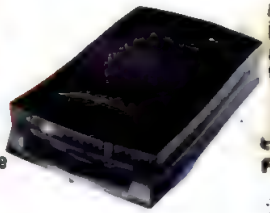

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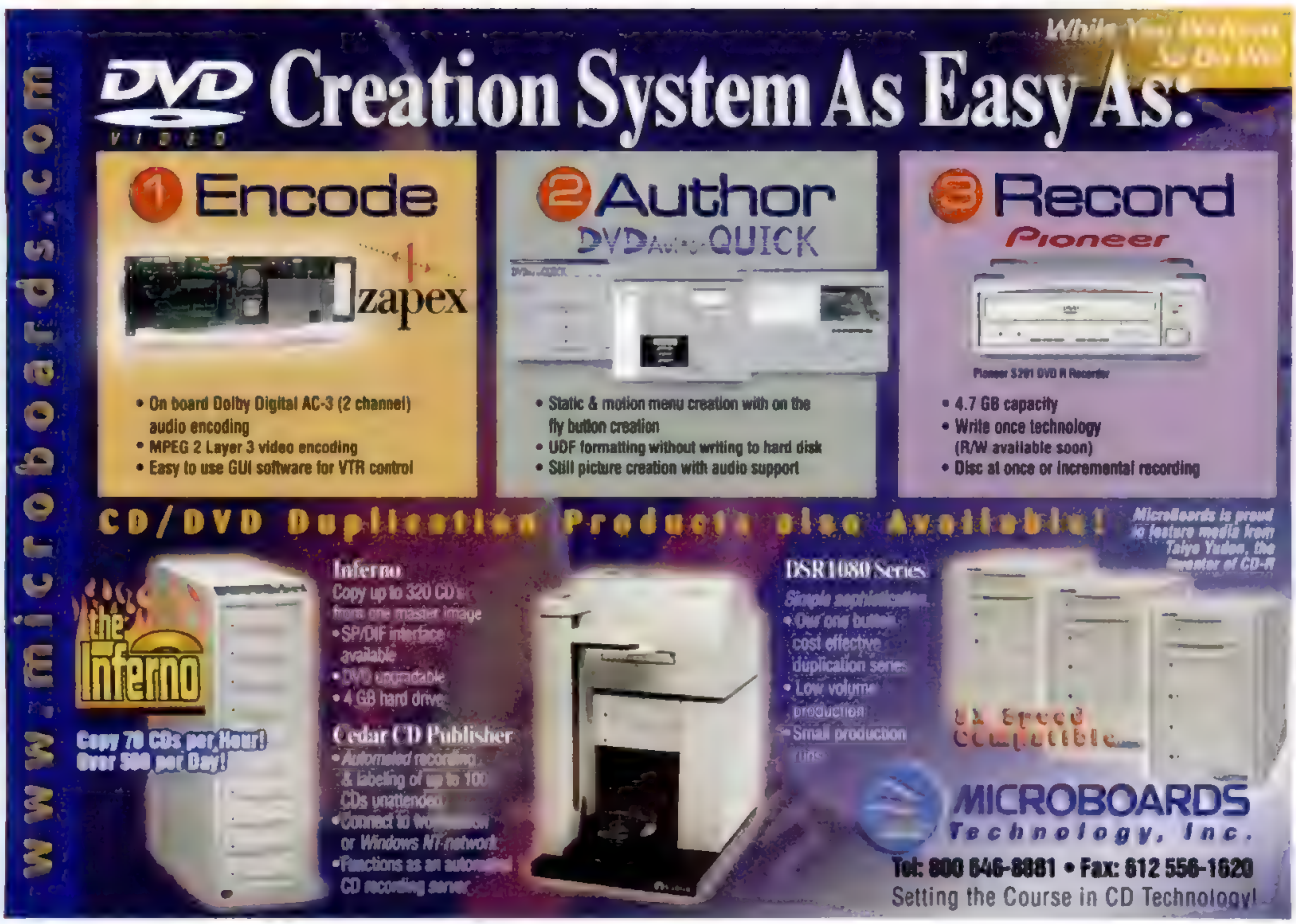

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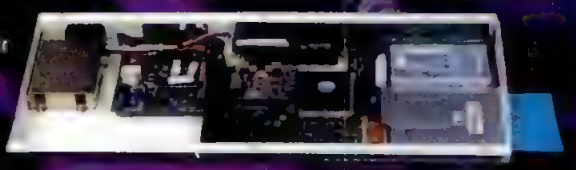

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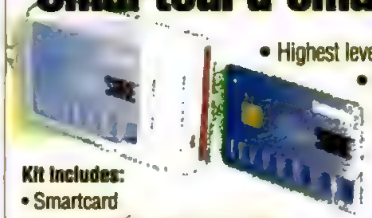

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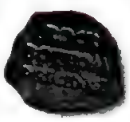

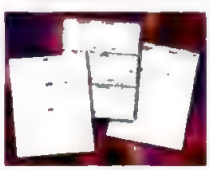

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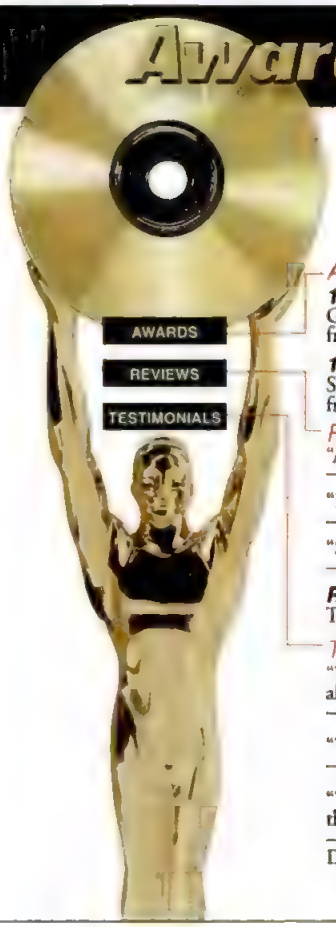

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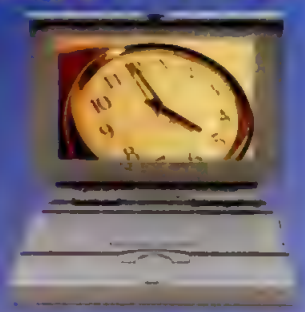

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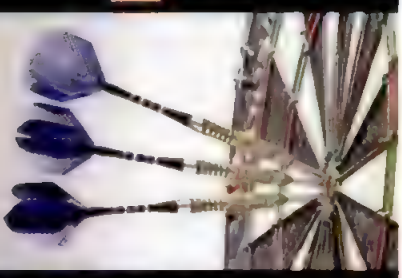

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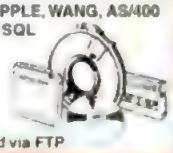

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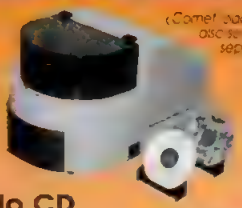

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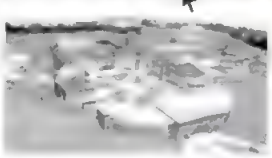

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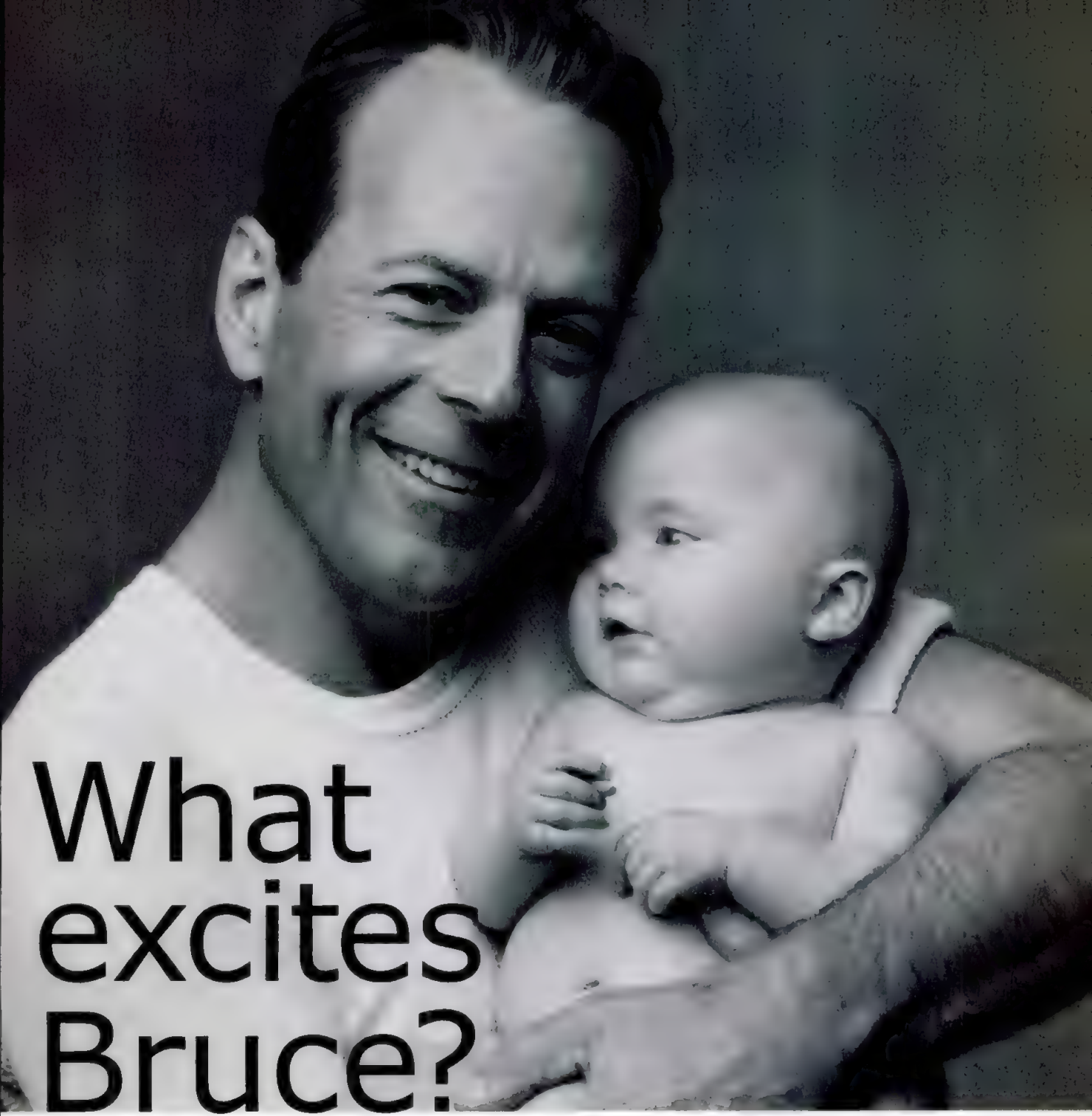

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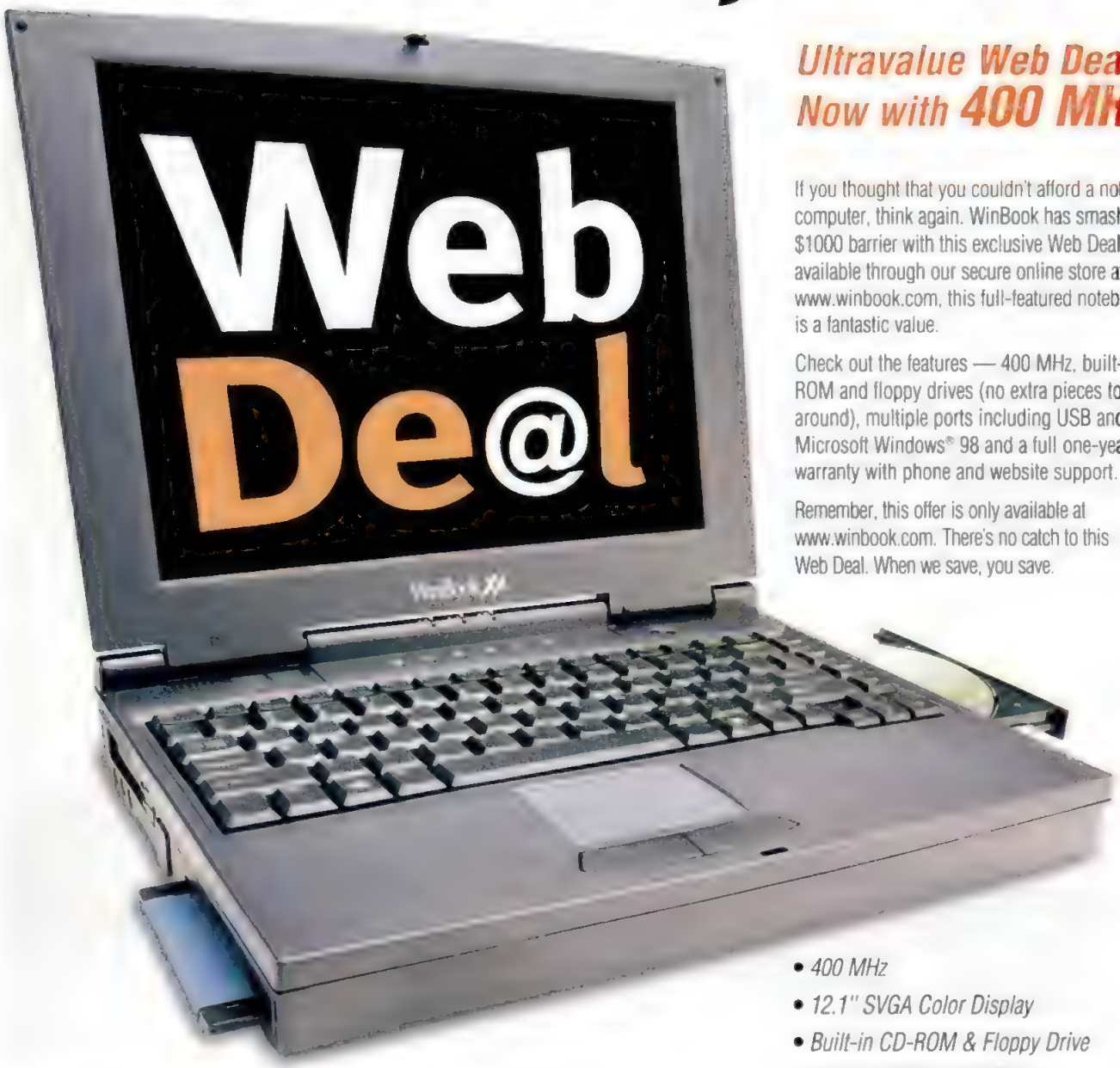

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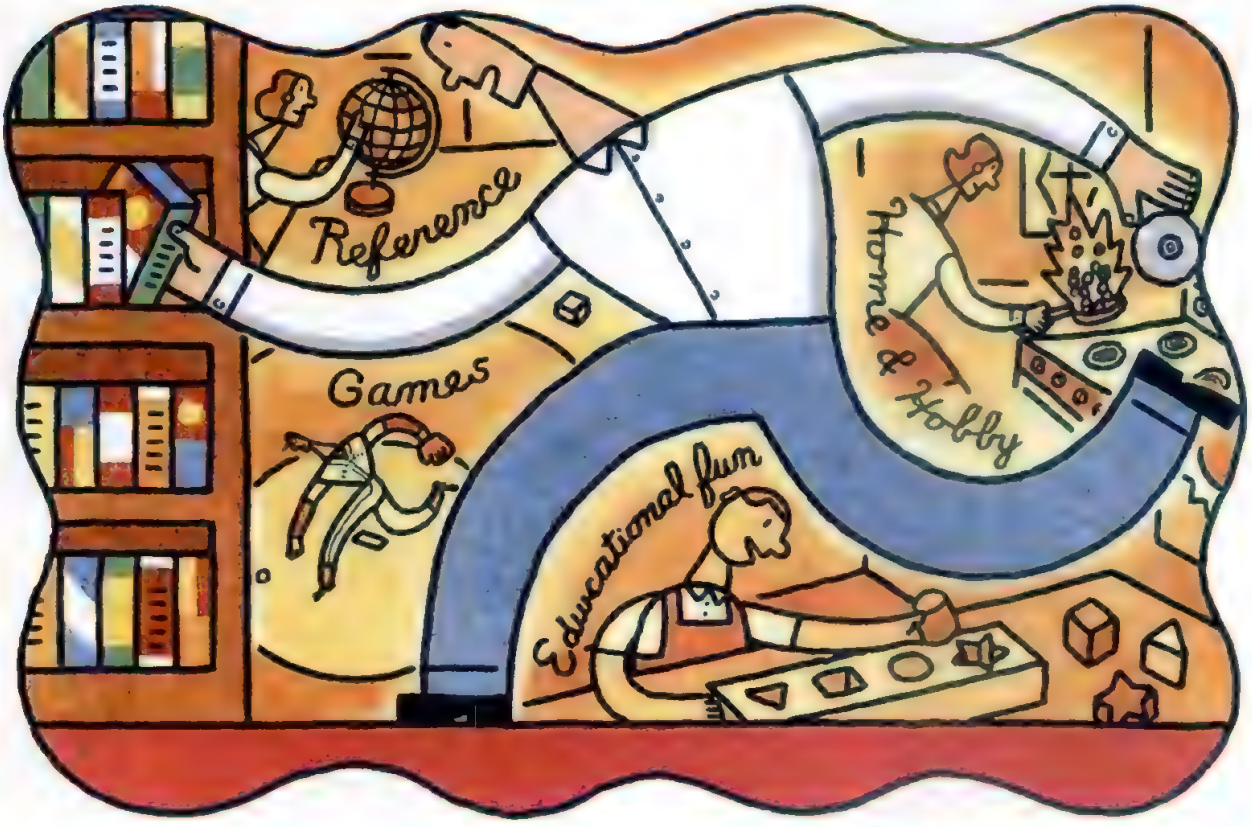


Ultimate Software Library

Our look at the top 100 home-oriented CDs. By James A. Miller

The compact disk has evolved from being an exotic storage medium to being *the* means of software distribution. Similarly, our annual compilation of the 100 best CDs is now a compendium of the 100 best titles for personal use, for reference, for fun, and for education.

We've divided the software titles into four categories: educational fun, covering two age ranges (9 and under and 10 and up); games; home and hobby; and reference. Not all CDs of the same type, however, are appropriate for the same age group. So, for example, we included a few different encyclopedias under *reference,* because one that is best for a grade schooler may not work that well for a high school student.

DVDs are slowing coming into their own, but the drives don't yet have enough market penetration to compel software vendors to shift over more than a handful of titles, so the Ultimate Software Library remains a mostly CD compilation. Where appropriate, however, we've indicated exceptional DVD titles. Who in possession of a DVD-ROM drive wouldn't choose the 4-disk DVD version of The Complete National Geographic over the 31-disk CD edition?

No matter what your age is or where your interests lie, you'll find a number of products on this list to suit your needs.

ILLUSTRATION BY JAMES KACZMAN

EDUCATIONAL FUN

AGES 9 AND UNDER

Active Play, A Bug's Life ($19.99 list; ages 3–7; Disney Interactive, 800-900-9234, *www.disneyinteractive.com*). Save the bug colony from grasshopper invasion. On the way, read or listen to a fact sheet on any bug that crosses your path.—*VK*

Backyard Soccer ($19.99 list; ages 5–10; Humongous Entertainment, 800-499-8386, *www.humongous.com*). The lively, cartoonlike graphics are perfect for youngsters, who also get to pick their teams' players, logos, names, and uniform colors, in addition to hearing real-time commentary on their game. Work-alike siblings: Backyard Baseball, Backyard Football (due out in October).—*JAM*

The Clue Finder's 4th Grade Adventure ($19.95 list; The Learning Company, 800-227-5609, *www.learningco.com*). This fun game builds on children's interest in mystery and adventure as well as their abilities in math, art, geography, science, and logical thinking.—*CR*

Crayola Make a Masterpiece ($19.95 list; ages 5–12; IBM Consumer Division, 800-320-8377, *www.pc.ibm.com*). This CD teaches kids about famous artists, works of art, and art styles. Also, it has all kinds of tools to play with, so children can create their own pictures or doctor existing photos.—*AG*

Detective Barbie ($34.99 list; ages 5 and up; Mattel Media, 888-628-8359, *www.mattelmedia.com*). A great way for little girls to learn critical thinking and problem-solving skills, Detective Barbie is visually appealing and fun, with a Nancy Drew–like story line.—*AG*

Dr. Seuss Preschool ($29.99 list; Broderbund Software/The Learning Company, 800-548-1798, *www.learningco.com*). Excellent animation and encouraging banter will hold even the shortest attention spans while introducing tykes to Theodor Seuss Geisel's make-believe world.—*JAK*

D.W. the Picky Eater ($29.95 list; ages 3–7; Broderbund Software/The Learning Company, 800-548-1798, *www.broderbund.com*). This program teaches kids reading skills, the food groups, hand/eye coordination, and more. It's fun to play, with clear sounds and great graphics.—*AG*

Sesame Street Elmo's Preschool ($20 street; Creative Wonders/The Learning Company, 800-548-1798, *www.learningco.com*). Elmo laughs and encourages while he teaches numbers, early reading and math, and social skills. Also, the animation is seamless.—*JAK*

I Love Spelling! ($26.95 list; ages 7–11; DK Interactive Learning, 800-352-6651, *www.dk.com/us/interest/cdroms*). Wonderfully animated and amusing characters take children to several eerie planets to practice spelling. Kids play word group games, sort scrambled letters, and learn about prefixes and suffixes.—*JP*

ACTIVE PLAY, A BUG'S LIFE

JUMPSTART PRESCHOOL

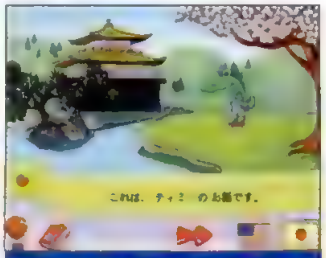
JumpStart Preschool ($30 list; Knowledge Adventure Inc., 800-545-7677, *www.knowledgeadventure.com*). Friendly characters guide kids through an early understanding of letters, numbers, shapes, and colors. The JumpStart series is a must-have, from infancy to grade school.—*CR*

Junkland Jam ($9.95 list; ages 6–10; SouthPeak Interactive, 800-774-6183, *www.southpeak.com*). Take Simon Fehfer on a journey through a strange musical world to find his harmonica. You'll run into wacky animated characters, hidden puzzles, and cool experiments.—*JAM*

Let's Go Read! 2 ($44.95 list; ages 5–7; Edmark Corp., 800-691-2986, *www.edmark.com*). This entertaining reading adventure makes use of voice recognition to strengthen reading skills. Nine original read-alone electronic books integrate the new words your child has learned.—*CR*

MathQuest With Aladdin ($20 street; ages 6–9; Disney Interactive, 800-900-9234, *www.disneyinteractive.com*). Kids will have a ball learning math from 18 challenging activities built around Disney's *Aladdin* characters.—*JAM*

My First Amazing Science Explorer ($29.95 list; ages 6–10; DK Interactive Learning, 800-937-5557, *www.dk.com/us/interest/cdroms*). This wonderful program creatively uses animated effects to enhance learning and make it enjoyable. Science Explorer helps build a basic foundation of scientific knowledge by teaching through experiments, researched answers, and recorded findings.—*CR*



TRAVEL THE WORLD WITH TIMMY

Reader Rabbit's Complete Learn to Read System ($60 street; ages 3–7; The Learning Company, 800-548-

OUR CONTRIBUTORS: Mary E. Behr, Glen Boisseau Becker, Rich Brown, Matthew Elliott, Angela Graven, Diane Jecker, Jeremy A. Kaplan, Vir Kashyap, Debora Lidov, Carol A. Mangis, Jay Munro, Maggie Overfelt, Sarah Pike, Jacqueline Pino, Charles Rodriguez, Paul B. Ross, Nancy Sirapyan, Michael J. Steinhart, and S. Jae Yang are on staff at *PC Magazine*. Adam Asch, Rich V. Dragan, Josh Levy, and Michael E. Ryan are freelance writers. James A. Miller was the associate editor in charge of this story.

1798, *www.learningco.com*). Kids have been learning from Reader Rabbit for years. They'll step into a richer educational world, however, with this edition: a whole system of learning that integrates a workbook, seven storybooks, flash cards, a parents' guide, simple navigation, and interactive characters to lead kids through Wordville.—*JAM*

Thinkin' Things: All Around FrippleTown ($30 street, ages 4–8; Edmark Corp., 800-691-2986, *www.edmark.com*). Geared toward young children, FrippleTown has colorful, bubbly animations with lots of cute sounds. An intuitive interface brings up four activities to improve problem-solving and navigational skills.—*AG*

Travel the World with Timmy ($29.95 list; ages 4–7; Edmark Corp., 800-691-2986, *www.edmark.com*). In

this charming package, a cartoon alligator escorts kids to Argentina, Japan, and Kenya. Games, crafts, interactive stories, and songs evoke these nations' cultures and languages, boosting learning skills and crosscultural understanding.—*GBB*

AGES 10 AND UP

Animaniacs: A Gigantic Adventure ($19.95 list; ages 8 and up; SouthPeak Interactive, 800-774-6183, *www.southpeak.com*). Guide the Warner Brothers and their sister Dot through the famed studio's sets, collecting classic Animaniacs reels and evading villains. Rich multimedia and irreverent humor make this title a winner.—*MJS*

Art Dabbler ($49.95 list; ages 9 and up; MetaCreations Corp., 800-846-0111, *www.metacreations.com*). Art Dabbler combines rich content and powerful imaging effects with strong painting and drawing tools. Its sketch-pad interface is highly intuitive.—*JAM*

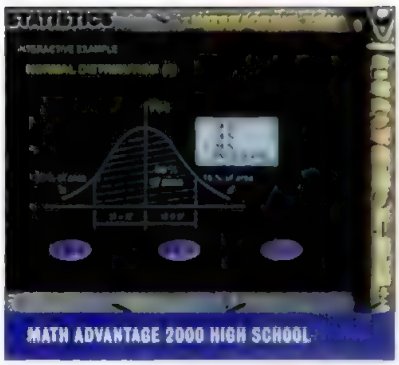
Girls Only! Secret Diary & More! ($19.99 list; ages 7 and up; Encore Software, 310-342-0600, *www.encoresoftware.com*). This password-protected diary is simple and fun to use, with five essential features: Secret Diary, Personal Calendar, Stationery Creator, Address Book, and Secret Message Maker.—*JP*

Kaplan Emergency Prep SAT/ACT ($14.99 list; Knowledge Adventure Inc., 800-527-4836, *www.knowledgeadventure.com*). An excellent tool for students who put off studying till the last minute or need a refresher course. Emergency Prep has tips and tricks for all the exam sections, and advice on how to prepare for the college admissions process.—*AG*

KidPix Deluxe ($19.95 list; ages 8–12; The Learning Company, 800-548-1798, *www.learningco.com*). KidPix integrates animation, video, special effects, photography, and music with an art program. The result is much more than a run-of-the-mill coloring book. Count on your child spending hours creating.—*CR*

Math Advantage 2000 High School ($39.99 list; Encore Software, 310-342-0600, *www.encoresoftware.com*). These seven CDs span the entire high school mathematics curriculum, from prealgebra to calculus. An engaging interface and effective multimedia will retain teenagers' attention while infusing them with valuable knowledge.—*SJY*

Nature: Virtual Serengeti ($30 street; ages 9 and up; Grolier Interactive, 203-797-3530, *www.gi.grolier.com*). Make a documentary and have fun learning vocabulary, geography, and facts about the many animals that make up this diverse ecosystem.—*JAM*



The Princeton Review: Inside the SAT, PSAT and ACT '99 Deluxe ($40 street; The Learning Company, 800-548-1798, *www.learningco.com*). This package has it all: a comprehensive prep course, practice tests, scoring analysis, SAT vocabulary words, university profiles, and financial aid information.—*AG*

Reader Blaster Ages 9–12 ($14.95 list; Knowledge Adventure Inc., 800-545-7677, *www.knowledgeadventure.com*). Reader Blaster Ages 9–12 combines a good old-fashioned plot with language-building puzzles. Fun tasks help kids learn about synonyms, antonyms, definitions, reading comprehension, parts of speech, and grammar.—*JAM*

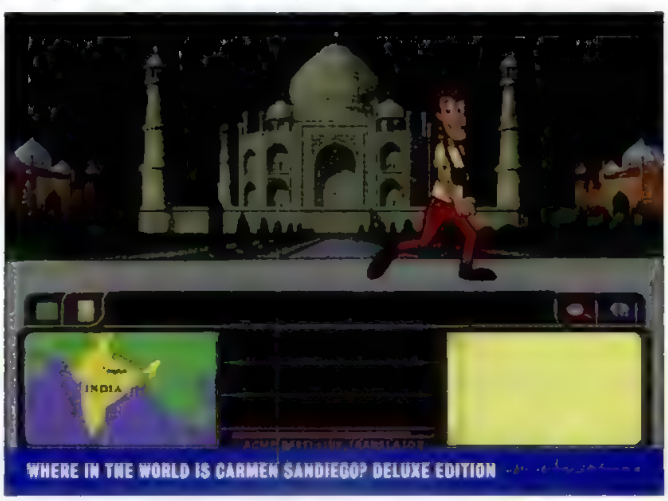
The Robot Club ($29.95 list; ages 10 and up; SouthPeak Interactive, 800-774-6183, *www.southpeak.com*). Kids learn real programming skills while building their own (virtual) robots and sending them on missions.—*AA*

Star Wars DroidWorks ($39.95 list; ages 7 and up; Lucas Learning, 888-887-7909, *www.droidworks.com*). Your mission, young Jawa, is to use your scientific and critical-thinking skills to make the right droid to help the Rebels defeat the Empire.—*AA*

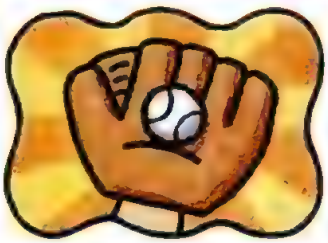
Star Wars Episode I The Gungan Frontier ($29.95 list; ages 9 and up; Lucas Learning, 888-887-7909, *www.gunganfrontier.com*). Create a thriving ecosystem populated by the right balance of plants and animals. Filled with remarkable graphics and *Star Wars* characters, The Gungan Frontier will engage kids for hours while they learn.—*AA*

Thinkin' Things: Galactic Brain Benders ($30 street; ages 8–12; Edmark Corp., 800-691-2985, *www.edmark.com*). Brain Benders has five fun activities designed to teach kids logic, the basics of computer programming, physics, and critical thinking.—*AG*

Where in the World is Carmen Sandiego? Deluxe Edition ($30 street; ages 9 and up; The Learning Company, 800-227-5609, *www.learningco.com*). Being a gumshoe is more fun when you get to travel the world and study the languages, demographics, and cultures of faraway countries. But don't forget to piece together clues about suspected villains on the way!—*MO*



AFTER HOURS



GAMES

Baldur's Gate ($40 street; Interplay Productions, 800-468-3775, *www.interplay.com*). This epic fantasy role-playing game is set within the Advanced Dungeons & Dragons Forgotten Realms universe. The goal: Find and eliminate the source of strife in Sword Coast.—*MER*

EverQuest ($45 street plus $9.89 per month; 989 Studios/Sony Computer Entertainment Group, 800-345-7669, *www.989studios.com*). Despite fairly simplistic game play, EverQuest is the sort of game that keeps you glued to your PC. It's most enjoyable when you recruit friends to tackle its world of fierce creatures.—*MER*

Fallout 2 ($25 street; Interplay Productions, 800-468-3775, *www.interplay.com*). Fallout 2 is bigger and better than the original, which is one of the most popular role-playing games ever. Fend off mutants as you wander the postapocalyptic world, searching for the Garden of Eden Construction Kit. (Adult content.)—*MER*

F-15 ($20 street; Jane's Combat Simulations, 800-245-4525, *www.janes.ea.com*). Sit in the cockpit of the Air Force's air-superiority fighter in Operation Desert Storm or in a hypothetical campaign in Iran. Either way, you'll marvel at gorgeous graphics and eye-popping realism.—*MER*

FIFA 99 ($25 street; EA Sports, 800-245-4525, *www.easports.com*). FIFA 99 is the most realistic soccer game yet, with exceptional graphics, fast-paced game play, and a choice of over 250 world teams.—*MER*

Grim Fandango ($30 street; LucasArts Entertainment Co., 888-532-4263, *www.lucasarts.com*). Film noir and Mexican folklore collide in this amazing adventure into the Land of the Dead. In this wild environment, your task is to help out Manny, a down-on-his-luck reaper/travel agent.—*MER*

Half-Life ($30 street; Sierra Studios, 800-757-7707, *www.sierrastudios.com*). An excellent 3-D graphics engine, cinematic design, and an "X-Files"–like storyline (you've survived a deadly accident at a top-secret government facility) provide a highly immersive and downright terrifying game experience. This one is definitely not for younger folks or the squeamish.—*MER*

Heavy Gear II ($40 street; Activision Inc., 310-255-2000, *www.activision.com*). Control a giant, robotic war machine and lead a squad through ferocious, futuristic, and spectacularly rendered battles.—*MER*

Heretic II ($30 street; Activision Inc., 310-255-2000, *www.activision.com*). Corvus the elf must save his people from a plague in this sometimes bloody and violent sequel. Excellent 3-D graphics and intricate levels are some of the game's highlights. Also, the Tomb Raider–like third-person angle is a nice break from typical action fare.—*MER*

Heroes of Might & Magic III ($40 street; The 3DO Company, 800-336-3506, *www.3do.com*). In this sequel, your challenge is to build powerful armies and shining cities as you are fending off rivals and exploring the countryside. The crisp, colorful graphics and addictive game play will make it difficult to walk away from your PC.—*MER*

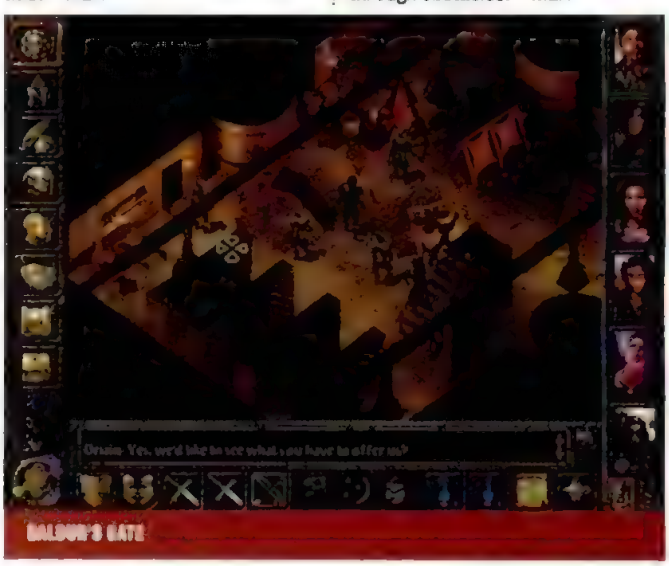
High Heat Baseball 2000 ($20 street; The 3DO Company, 800-336-3506, *www.3do.com*). No other title does as good a job of recreating the feel of a real baseball game. High Heat may not have the flashy graphics of some competitors, but it does give you total roster control and also has the most challenging artificial intelligence we've seen in a PC baseball title.—*MER*

Independence War ($40 street; Infogrames Entertainment Inc., 877-463-6472, *www.infogrames.net*). Though it may intimidate novices, hard-core space combat fans should find a lot to like in this game's realistic flight model, complex story line, and challenging missions.—*MER*

Jack Nicklaus 6: Golden Bear Challenge ($30 street; Activision Inc., 310-255-2000, *www.activision.com*). With great graphics, realistic but customizable game play, and a killer course designer, Jack Nicklaus 6 is simply the best golf game going.—*MER*

Madden NFL 99 ($30 street; EA Sports, 800-245-4525, *www.easports.com*). All gridiron fans should check out this title, the year's best football game. It has great graphics and numerous enhancements over previous versions, as well as support for multiple seasons and the risk of being fired for losing.—*MER*

Midtown Madness ($30 street; Microsoft Corp., 800-426-9400, *www.microsoft.com/games*). If you think rush hour in the real world is bad, just wait until you see this virtual Windy City's gridlock. Of course, in the game, you have the option of running into, over, or through obstacles.—*MER*



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AFTER HOURS

MONACO GRAND PRIX RACING SIMULATION 2

Monaco Grand Prix Racing Simulation 2 ($39.95 list; Ubi Soft Entertainment, 800-824-7638, *www.ubisoft.com*). Monaco Grand Prix, one of the best auto-racing games around, combines realistic action with exhilarating graphics and competition against the world's leading drivers.—*MER*

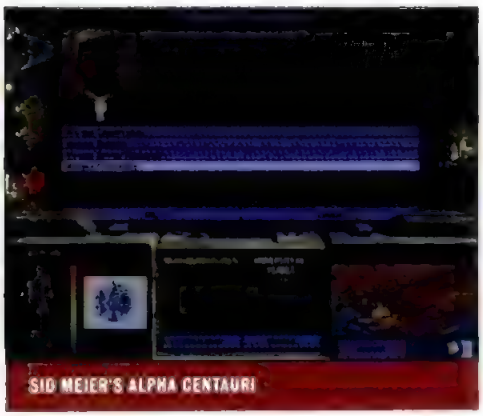
Myth II: Soulblighter ($39.95 list; Bungie Software, 800-295-0060, *www.bungie.com*). In the challenging and thrilling Myth II, you must rid the world of the vile Soulblighter. The action unfolds in spectacular detail (excessive violence and gore can be turned off), with wonderfully animated units battling over lush 3-D terrain.—*MER*

NHL 99 ($25 street; EA Sports, 800-245-4525, *www.easports.com*). Stellar graphics and player animations make NHL 99 one of the most lifelike sports games ever. Take your team through a season, make trades, create custom players, or compete in an international tournament.—*MER*

Pro Pinball Big Race USA ($19.95 list; Empire Interactive, 800-216-9706, *www.empire-us.com*). One of the best PC pinball games ever, Pro Pinball Big Race USA offers terrific 3-D graphics and a great table design, with numerous minigames.—*MER*

Sid Meier's Alpha Centauri ($40 street; Firaxis Games/Electronic Arts, 800-245-4525, *www.alphacentauri.com*). Though Alpha Centauri isn't a sequel, the influence of Meier's classic Civilization II shines through. Use military, economic, or diplomatic methods to lead your people as you attempt to establish a thriving new civilization in space.—*MER*

Starcraft ($40 street; Blizzard Entertainment, 800-953-7669, *www.blizzard.com*). Perhaps the best real-time strategy game yet, Starcraft's intricate plot challenges you to employ tactics and units of three conflicting species. An impressive multiplayer component has made it one of the most popular games on the Internet.—*MER*


SID MEIER'S ALPHA CENTAURI

Starsiege: Tribes ($40 street; Dynamix/Sierra, 800-757-7707, *www.sierra.com*). This unique game of science-fiction combat draws thousands of Internet players every day—and with good reason. The graphics are fantastic, and the game play and teamwork are intense.—*MER*

Star Wars Episode 1: Racer ($40 street; LucasArts Entertainment Co., 888-532-4263, *www.lucasarts.com*). Experience the thrills and chills of Episode 1's pod-racing scene. This game's spectacular 3-D graphics and sense of speed make it one of the most exciting and visually stunning titles this year.—*MER*

Star Wars: X-Wing Alliance ($49.95 list; LucasArts Entertainment Co., 888-532-4263, *www.lucasarts.com*). The final installment of the classic X-Wing series is a superlative space combat strategy simulation. As a hotshot pilot, you must balance the needs of your family's business with the needs of the Rebels to help defeat the dreaded Empire.—*MER*

Total Air War ($25 street; Infogrames Entertainment Inc., 877-463-6472, *www.did-us.com*). Control an entire air campaign: You have the unique ability to jump into the cockpit of any F-22 multirole fighter in the theater. The underlying flight simulation is among the best.—*MER*

Worms Armageddon ($30 street; MicroProse/Hasbro Interactive, 800-400-1352, *www.microprose.com*). In this addictive and wacky game, you must lead your worms to victory using the 60 different weapons at your disposal. It features cartoon-style landscapes and animation. Sound weird? It is, but it's also a lot of fun.—*MER*

WWII Fighters ($39.95 list; Jane's Combat Simulations, 800-245-4525, *www.janes.ea.com*). WWII Fighters is this year's best World War II combat flight simulator. With its remarkable, customizable, and lifelike 3-D graphics and difficulty, Fighters should appeal to all PC pilots.—*MER*

WORMS ARMAGEDDON

Thief: The Dark Project ($35 street; Eidos Interactive, 800-617-8737, *www.eidosinteractive.com*). Unlike with most first-person action games in its genre, the goal of this unique and challenging title is to move quietly and hide whenever possible; confrontation is generally not a good idea.—*MER*

Tom Clancy's Rainbow Six Gold Pack ($29.95 list; Red Storm Entertainment Inc., 800-863-3550, *www.redstorm.com*). Plan and execute dangerous antiterrorist missions with a crack team of elite soldiers. Rainbow Six adds groundbreaking strategic elements and realism to first-person action games.—*MER*

You Don't Know Jack: The Ride ($30 street; Berkeley Systems Inc./Sierra Attractions, 800-757-7707, *www.berksys.com*). The most recent edition of YDNJ—and the best and most irreverent yet—The Ride will leave fans and newcomers in stitches. It features new question categories and a theme-oriented design that lets you choose topics.—*MER*

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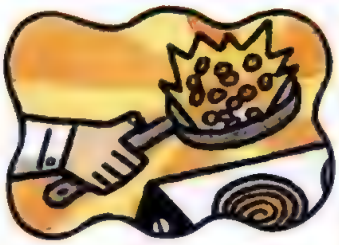
AFTER HOURS



HOME AND HOBBY

Acid Pro ($80 street; Sonic Foundry, 800-577-6642, *www.sonicfoundry.com*). Acid is an addictive way to make music, even if you can't play a note. Assemble songs from dozens of prerecorded loops and control the tempo, pitch, and volume of each loop, blasting solos or weaving harmonies.—*JM*

The All New All Purpose Joy of Cooking ($19.99 list; CompuWorks/Simon & Schuster Interactive, 800-229-2714, *www.wizardworks.com*). With its familiar design and copious practical cooking advice, The Joy of Cooking CD-ROM is just what you'd expect and more.—*MO*

American Greetings CreataCard Gold 3 ($49.95 list; Broderbund Software/The Learning Company, 800-548-1798, *www.broderbund.com*). A bright, accessible interface gently guides users through an abundance of personalized activities to create greeting cards, stationery, and stickers. Perfect for families.—*MO*

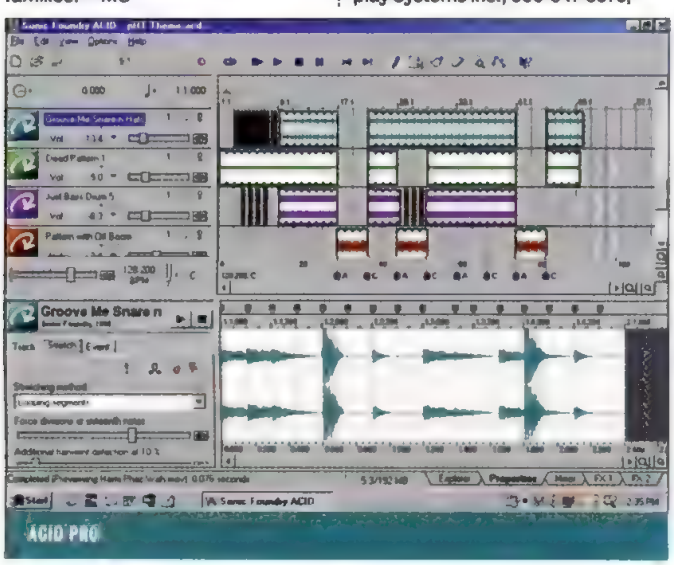
Backstage ($25 street; Clarence Sheridan, 800-562-4377, *www.theater3d.com*). Backstage is a must-have for anyone who loves the theater. Solve drama-inspired puzzles while navigating the maze-like backstage of a Broadway theater in an attempt to get onstage before the curtain rises.—*JAM*

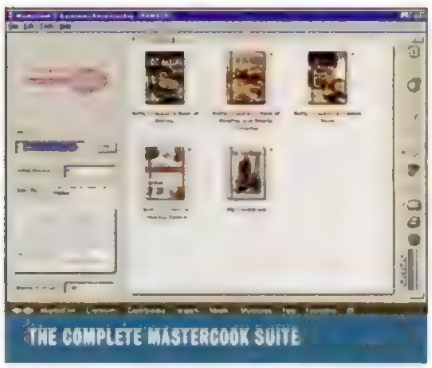
Complete Chess ($39.99 list; Sierra Attractions, 800-757-7707, *www.sierra.com*). Three skill levels, an intuitive interface, and an adaptive chess engine make this program just what the beginner (and the expert) ordered.—*JAM*

Complete Home Designer 3.0 ($49.95 list; Data Becker Corp., 781-453-2340, *www.databecker.com*). Design and print out professional-quality floor plans, or use one of many sample plans. But don't stop with the interior: Landscape your lawn or add a pool and deck.—*JM*

The Complete MasterCook Suite Featuring Betty Crocker ($49.95 list; Sierra Home, 800-757-7707, *www.sierrahome.com*). Flip through this title's five Betty Crocker cookbooks—the most trusted in American cuisine. Fill out interactive pantry/shopping lists, and design and publish your own cookbook.—*MO*

Dramatica Pro ($399 list; Screenplay Systems Inc., 800-847-8679, *www.screenplay.com*). Dramatica Pro can help serious writers find and fix plot holes and weak characters. Story Engine, for example, tracks relationships between characters and plot, reflecting modifications in the story.—*JAM*





Family Tree Maker Deluxe, Version 6 ($90 street; Broderbund/The Learning Company, 800-548-1798, *www.broderbund.com*). Though it's easy and fun to use, Family Tree Maker's real strength lies in its vast research capabilities. At your disposal are the FamilyFinder Index, to direct you toward the right data, and excellent Internet research support, as well as plenty of optional CDs with additional archive information.—*JAM*

Hewlett-Packard Printable Expressions Greeting Cards: The Clem Bodwell Geometric Collection ($25 street; Hewlett-Packard Co., 888-999-4747, *www.printableexpressions.hp.com*). Two dozen of the bold, colorful, stained-glass-like paintings of Clem Bodwell compose the entire art gallery in this edition of HP's Printable Expressions. Though some HP printers bundle Printable Expressions software, it can also be bought separately.—*SP*

Home Studio 8 ($129 list; Cakewalk Software, 888-225-3925, *www.cakewalk.com*). Cakewalk moves professional recording, mixing, and editing out of the studio and into the home. A graphical mixing board lets you record and mix sound for presentations, while support for AVI, MPG, and QuickTime lets you lay in music tracks or overdub home movies.—*JM*

Mavis Beacon Teaches Typing 9 ($40 list; Mindscape Inc./The Learning Company, 800-881-9919, *www.shoptic.com*). Enter the virtual classroom of Mavis (the fictional grande dame of typing instruction) for lessons on everything from ergonomics to speed and accuracy to get yourself typing in no time or refresh your rusty skills. Download fresh new custom lessons from the Web.—*AA*

Microsoft Home Publishing Suite 99 (with **Picture It! 99**) ($54.95 list, Microsoft Corp., 800-426-9400, *www.microsoft.com*). This robust, intuitive, and reasonably priced desktop publishing and photo-editing package gives home users everything they need to work with photos and create their own publishing projects, such as greeting cards, stationery, labels, and posters.—*SP*

Microsoft Money 99 Financial Suite ($64.95 list (with $25 rebate until November 1, 1999); Microsoft Corp., 800-426-9400, *www.microsoft.com/money*). Track investments, calculate net worth, schedule debt reduction, plan for retirement, and analyze your outlays and income, all from within this integrated powerhouse.—*PBR*

Microsoft Works Suite 99 ($110 street; Microsoft Corp., 800-426-9400, *www.microsoft.com/works*). A terrific value, Suite 99 has Word

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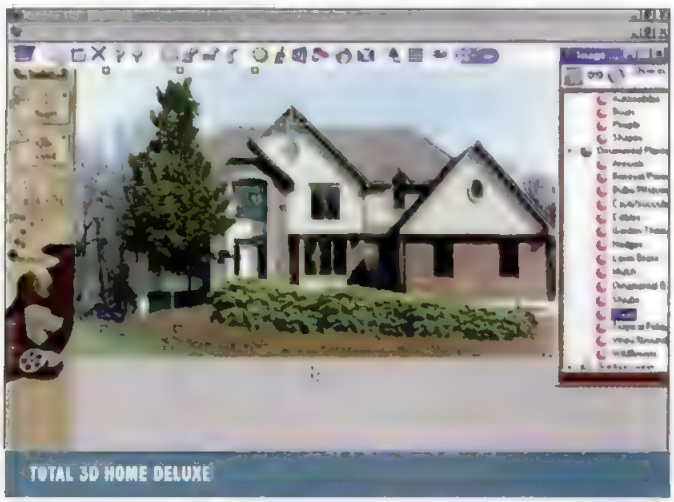
97; spreadsheet, database, and calendar creation tools in Works 4.5; and recent editions of Encarta, Expedia Streets, Graphics Studio Greetings, and Money 99 Basic Edition.—*JAK*

Music Ace 2 ($49.95 list; Harmonic Vision, 800-644-4994, *www.harmonicvision.com*). Music Ace combines animated notes and instruments to teach music in a way that's fun for all. Challenge your skills with games, modify existing music, or create your own scores.—*JM*



Office Graphics 2000 ($29.95 list; Streetwise Software, 310-829-7827, *www.swsoftware.com*). Office Graphics 2000 is a set of handy, low-end, easy-to-use graphics utilities that work directly with Microsoft Office 97 or Office 2000. It includes photo editing and archiving, fonts, tons of clip art, and dozens of document templates for Microsoft Office.—*RVD*

The Print Shop Deluxe 6.0 ($40 street; Broderbund Software/The Learning Company, 800-548-1798, *www.broderbund.com*). The Print Shop 6.0 adds integrated photo editing and Web site design to the mix. You can now edit, enhance, and organize digital images, then publish them to the Web.—*DJ*

Professor Franklin's Instant Photo T-Shirt ($39.95 list; Streetwise Software, 310-829-7827, *www.swsoftware.com*). Creating personalized photo T-shirts has never been easier. Simply print any image onto transfer paper, iron the paper to a T-shirt, and peel. Use Photo Effects to alter your picture.—*JM*

Quicken Financial Planner ($39.95 list; Intuit Inc., 800-224-0991, *www.intuit.com*). Want to buy a new car or save for retirement and a house? Quicken Financial Planner can help you define your financial goals and assess your plan's potential for success.—*JAM*

Sierra Complete LandDesigner 5.0 ($50 street; Sierra Home, 800-757-7707, *www.sierrahome.com*). Engaging graphics and an intuitive interface make this title a winner. New to Version 5.0 are 3-D walkthroughs and the ability to view a garden's growth over time.—*CAM*

Teach Me Guitar ($49.95 list, Voyetra Turtle Beach Inc., 800-233-9377, *www.voyetra.com*). The next-best thing to a live teacher, Teach Me Guitar combines a video instructor with an animated fret board that demonstrates fingering as you play.—*JAM*

Total 3D Home Deluxe ($49.95 list; Broderbund/The Learning Company, 800-548-1798, *www.broderbund.com*). Here is amazingly flexible home design software that lets you create a new house—from the plumbing to a real shade of Dutch Boy paint for the 3-D walls.—*RB*

REFERENCE

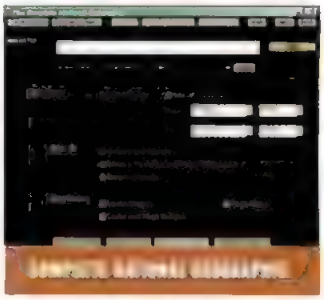
Berlitz Passport to 31 Languages ($30 street; The Learning Company, 800-548-1798, *www.learningco.com*). Passport isn't the package to get if you want to learn a single language. As a single source to learn the basics of several, however, it's hard to beat.—*AG*

The Complete National Geographic: 109 Years of National Geographic CD-ROM and **National Geographic Maps** (Complete: $130 street; Maps: $60; Mindscape/The Learning Company, 800-881-9919, *www.shoptlc.com*) The entire set of *National Geographic* magazines on 31 CDs or, better yet, only 4 DVDs ($150) takes up far less room than the thousands your grandmother passed down. A wonderful reference tool.—*AG*

National Geographic Maps collects every large foldout map ever issued by the National Geographic Society, dating back to 1889. These informative maps are an invaluable source of historical information and more.—*JAM*

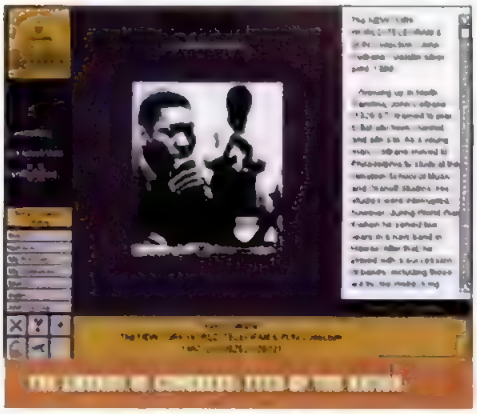
Country.com's Century of Country ($29.97 list; StarWorks Inc., 800-756-1816, *www.countryworks.com*). More than simply track listings for all three Hank Williamses, this encyclopedia is perfect for fans who want to know even the tiniest of details about their favorite singers or bands.—*MO*

Encarta Reference Suite 99 and **Encarta Africana** (Encarta 99, $100 street; Encarta Africana, $60; Microsoft Corp., 800-426-9400, *www.microsoft.com*). Encarta 99's browserlike, paned interface is jam-packed with text and multimedia content that is much more comprehensive than that of previous editions. It should now appeal not only to younger kids, but to high school and college students as well.—*DJ*



With contemporary interviews, scholarly articles, rich multimedia, and much more, Encarta Africana is not only the first CD-ROM of its kind but also a terrific resource of African-American culture.—*JAM*

Encyclopædia Britannica CD 99 ($99 list, Encyclopædia Britannica Inc., 800-747-8513, *www.eb.com*). Britannica 99 has richer multimedia content than previous editions, but still lags behind competitors such as Encarta. Its strength continues to lie in its unparalleled depth: at 44 million words, a terrific research tool.—*JAM*



Expedia Streets & Trips 2000 ($45 street, with $20 rebate; Microsoft Corp., 800-426-9400, *www.microsoft.com*). Expedia successfully combines trip routing with a robust address locator. Competitors can't match the quality of Expedia's maps,

which are much cleaner than DeLorme's and more detailed than both DeLorme's and Rand McNally's.—*JL*

The Library of Congress: Eyes of the Nation ($39.95 list; SouthPeak Interactive, 800-774-6183, *www.southpeak.com*). A collection of well-organized interactive maps, photographs, poems, and images from when settlers first crossed the Bering Strait though the election of Bill Clinton makes this the place to begin learning about North American history.—*RB*

Maptech National Park Digital Guide ($29.50 list per park; $69.50 each six regional sets, entire collection $179.50; Maptech Inc., 800-627-7236, *www.maptech.com*). These CDs provide interactive guidance to America's 54 national parks. They include detailed, easy-to-read maps from the park service and the USGS, as well as trail guides and other useful information.—*JL*

Quicken Family Lawyer 2000 Deluxe ($30 street; Broderbund/The Learning Company, 800-548-1798, *www.broderbund.com*). Family Lawyer Deluxe suite removes the mystery from legal jargon. An interview process helps you build and develop documents such as wills, living trusts, and powers of attorney.—*DJ*

Simon & Schuster New Millennium Encyclopedia ($30 street; Simon & Schuster Interactive, 212-698-7000, *www.ssinteractive.com*). Nine sources of information, including dictionaries, a thesaurus, an almanac, and an atlas—all at a low price—make this encyclopedia a great value for those who can't afford richer, much more expensive titles.—*DJ*

"Tell Me More" Spanish $79.95 list; Auralog Inc., 888-388-3535, *www.auralog.com*). A highly graphical interface makes navigating through these comprehensive Spanish lessons a snap. Speech recognition technology helps you see where you need improvements. Work-alikes include French, German, and Italian.—*AG*

Terrain Navigator ($29 to $99 list per CD, depending on the number of maps; Maptech Inc., 800-627-7236; *www.maptech.com*). This useful collection has the complete set of USGS topographical maps for almost every state in the nation. And its zoomable interface lets you home in on any region and print out exactly the map you need. —*JL*

TrailSmart National Park Maps: Eastern and Midwestern USA ($49.95 list; National Geographic, 800-962-1643, *www.nationalgeographic.com*). Obtain Park Service information guides, plot your route, or track your progress via GPS for any of 15 East and Midwest national parks. The "elevation profile" takes your plotted route and shows you the elevation of the entire path, scaled to your specifications.—*RB*

Walt Disney: An Intimate History of the Man and His Magic ($39.99 list; Disney Interactive, 800-328-0468, *www.disneyinteractive.com*). Wonderful animations, drawings, and cel art, as well as videos, photographs, and first-person accounts, paint a portrait of a man and the magic he created.—*JAM*

Coming Up

What's in the Next Issue of *PC Magazine*

The PC Magazine Top 100

The Internet changes everything, including our annual list of the most influential companies. *PC Magazine*'s senior editors have spent months deciding on this year's lists, and there will be more than a few surprises.

Your Virtual Office

Internet-standard mail servers. Groupware. E-mail appliances. And now outsourcing. E-mail has become an essential part of doing business. But how can you be sure you're picking the right route for your company—both today and as it grows? We'll test all the options, including, for the first time, outsourced solutions that let you get back to focusing on your business.

Monitor Roundup

With their affordable prices, 19-inch monitors are fast becoming the models of choice, at home and in the office. PC Magazine Labs will test 39 of them, and we'll tell you which are the best for business, graphics, and gaming.

Batter Up!

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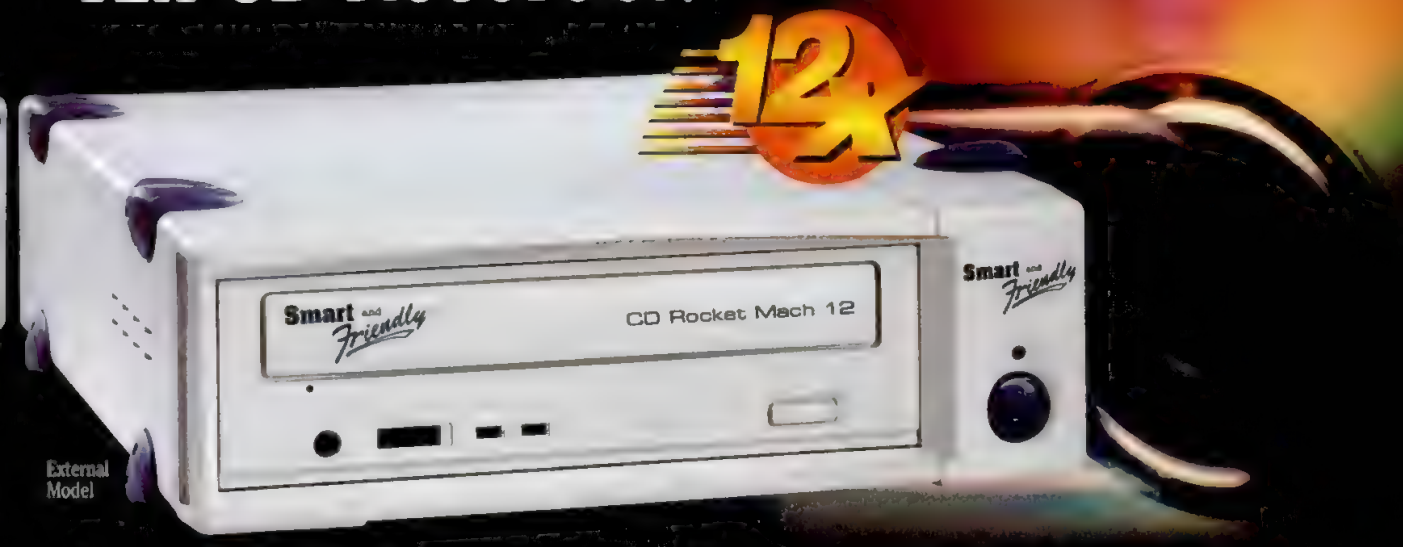

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CTRTM35C	**AMD K6-2/350 3DNow!**	17"	128MB PC 100	10GB UDMA	32X	AGP/8MB	AT/1MB Cache	**$25/Month**	**$819.99**	$419.99
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CTRTM50A	**Celeron 400MHz**	15"	64MB PC 100	8GB UDMA	32X	AGP/8MB	ATX/Slot 1	**$23/Month**	$699.99	$299.99
CTRTM51A	**Celeron 500MHz**	15"	96MB PC 100	8GB UDMA	32X	AGP/8MB	ATX/Slot 1/Socket 370	**$26/Month**	$829.99	$429.99
CTRTM39	**AMD K6-III/400 3DNow!**	17"	128MB PC 100	13GB UDMA	40X	AGP/8MB	ATX/1MB Cache	$30/Month	$949.99	$549.99
CTRTM47	**AMD K6-III/450 3DNow!**	17"	128MB PC 100	20GB UDMA	40X	AGP/8MB	ATX/1MB Cache	$34/Month	$1099.99	**$699.99**
CTRTM42B	**Pentium III 450**	17"	128MB PC 100	13GB UDMA	40X	AGP/8MB	ATX/Slot 1/Socket 370	**$33/Month**	$999.99	$599.99
CTRTM43B	**Pentium III 500**	17"	128MB PC 100	13GB UDMA	40X	AGP/8MB	ATX/Slot 1/Socket 370	$39/Month	$1099.99	$699.99
CTRTM45B	**Pentium III 550**	17"	128MB PC 100	20GB UDMA	40X	AGP/8MB	ATX/Slot 1/Socket 370	$43/Month	$1499.99	$1099.99
CTRTM46A	**Pentium III 600**	17"	128MB PC 100	20GB UDMA	40X	Voodoo 3 AGP/16MB	ATX/Slot 1	**$50/Month**	**$1649.99**	$1249.99

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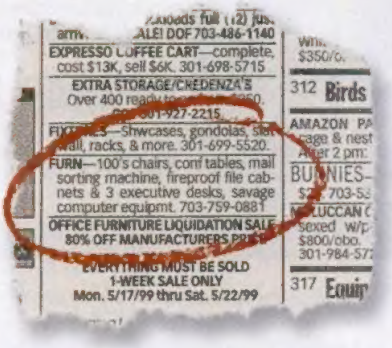
An ad for the Micro Solutions Backpack, a CD rewriter, suggests that the gadget is "a great way to preserve the sounds from those old LPs you've got lying around. (You don't still own a turntable, do you?)"

Well, wait a minute. If you don't own a turntable, then how exactly are you going to get the music off those old LPs you've got lying around? Just asking.

More classified intelligence. (*The Washington Post.*)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404 Error - Item Not Found

<haiku>
You step in the stream,
but the water has moved on.
That page is not here.
</haiku>

Well, if you have to see an error message, it may as well be a haiku. (Macmillan Publishers Web site.)

If your entry is used, we'll send you $50 and a *PC Magazine* T-shirt. Send your entries to Abort, Retry, Fail?, *PC Magazine*, 28 E. 28th St., New York, NY 10016-7930 or via e-mail to *don_willmott@zd.com*. Winners this issue: Bill Anderson, Ralph Brown, Milt Collins, Greg Giles, Ann Gullickson, and Romy Leibler.

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